NOTES ON ASTHMA:

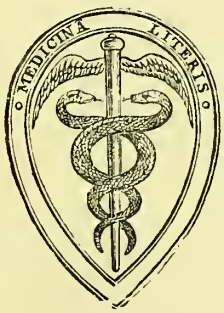
ITS

Nature, Forms, and Treatment.

BY

JOHN C. THOROWGOOD, M.D., Lond.,

FELLOW OF THE ROYAL COLLEGE OF PHYSICIANS OF LONDON;
VICE-PRESIDENT OF THE MEDICAL SOCIETY OF LONDON;
PHYSICIAN TO THE CITY OF LONDON HOSPITAL FOR DISEASES OF THE CHEST, VICTORIA PARK;
PHYSICIAN TO THE WEST LONDON HOSPITAL;
AND LECTURER ON MATERIA MEDICA AT MIDDLESEX HOSPITAL.



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BY THE SAME AUTHOR.

CONSUMPTION,

AND ITS

TREATMENT BY THE HYPOPHOSPHITES.

[THIRD EDITION PREPARING.]

"We recommend this pamphlet to our readers' most serious attention."—*Practitioner* on Second Edition.

PREFACE TO THIRD EDITION.

THE reader of this book must bear in mind that it does not profess to be a systematic Treatise on Asthma. With such a work our Profession has been already well supplied from the pen of the late Dr. HYDE SALTER; and though, since the publication of the first edition of these "Notes," that excellent and talented physician has been called away by death, yet his admirable monograph on Asthma remains as a valuable embodiment of rich experience and a worthy memorial of the author.

The present work is based upon such notes of Asthma, its forms and complications, as the author has been able to make during fourteen years' experience among patients at the Victoria-Park Hospital for Diseases of the Chest.

The cases recorded range themselves in two divisions, the first comprising instances of pure inorganic spasmodic asthma, due to constitutional and hereditary diathesis, or to individual susceptibility to some specific exciting cause; and among these the purely nervous form of asthma can be well studied.

In the second larger division may be placed instances of complicated and organic asthma; that is to say, asthma, in the sense of a spasmodic or paralytic neurosis, engrafted upon such pulmonary diseases as chronic bronchitis, emphysema of the lungs, or a complication of both these maladies.

Investigation with the laryngoscope having materially advanced our knowledge of certain troublesome and dangerous forms of obstructed breathing, I have in chapter iii. drawn attention to the diagnosis between bronchial asthma and laryngeal or tracheal dyspnœa.

The last chapter treats of Hay Asthma, and gives the results of very recent investigations and experiments to prove the real nature of this complaint, and the direction in which we must turn our preventive and curative method.

For purposes of treatment it is of some conse-

quence to distinguish spasmodic asthma, due to contraction of the small bronchial tubes, from dyspnœa due to bronchial and pulmonary paralysis. Pathologically these two conditions may not stand far apart as the paralytic state of lung is often the result of exhaustion of nerve force by repeated spasmodic seizures in the first instance.

Experience has taught me to insist much on the value of nerve tonics as curative agents in asthma, sedatives and antispasmodics on emergencies not being incompatible with tonics as our really curative medicines.

The prolonged use of expectorants is to be strongly reprobated; founded often on error in mistaking purely nervous for inflammatory symptoms, it is a practice likely to exhaust and enfeeble the bronchial muscle, to injure the tone of the digestive organs, and thus to do immense mischief.

I would also enter a caution against "polypharmacy" in the treatment of asthma, especially when using drugs from which we expect definite and specific action, such as strychnine, belladonna, arsenic, ipecacuanha, or quinia. I believe that one result of our advancing knowledge of disease should be to simplify our phar-

macy, and thus increase our acquaintance with the action of individual drugs, while at the same time we make our cures more certain and more lasting.

61 Welbeck Street, Cavendish Square, W.,
January, 1878.

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ON ASTHMA.

CHAPTER I.

Spasmodic Asthma. — The disease presents marked symptoms during life, yet has no morbid anatomy. — Action of the thoracic and bronchial muscles in respiration. — Asthma a spasm of the small muscles encircling the air-tubes of the lung, resembling gastric or intestinal spasm. — Varieties of Asthma.—Hæmic Asthma due to circulation of disordered or diseased blood.—Reflex Asthma from nervous excitement or irritation. — Specific Asthma caused by various animal or vegetable emanations. — Complicated and Organic Asthma distinct from the above, and to be treated of separately.

ONE who is in the grasp of a fit of true spasmodic asthma always presents an abundance of symptoms, which, while they last, are distressing enough to endure or to witness; and yet, when things seem to be about at the worst, and the patient well-nigh at his last gasp, a remission

comes on, the spasm yields, air enters the lungs, and the attack subsides, coincidently often with access of cough and mucous expectoration.

During the intervals between his attacks the patient probably enjoys fair health, and, as a rule, lives to a good age; should he, however, be cut off prematurely by death, what do we find as the morbid anatomy to explain the well-marked symptoms seen during life?

Practical experience may answer this question in the words of Sir T. Watson, uttered years ago in his lectures: "The bodies of asthmatics have often, on being examined after death, presented no vestige whatever of disease, either in the lungs or in the heart; evidence that the phenomena attending a fit of asthma may be the result of pure spasm."

So, too, the late Dr. Hyde Salter, in his classical treatise on Asthma, says: "A man may have been known during his life to have had attacks of asthma, he may have seemed over and over again almost *in articulo mortis* from want of breath; and yet, if death from some other cause gives an opportunity of examining his lungs, they may be found apparently in every way healthy — no trace of inflamma-

tion or its products, the vesicular structure perfectly normal, the passages leading to it lined by a healthy and unchanged membrane, the cavities of the pleura free from all abnormal contents, their surfaces smooth and apposed, the heart sound. The disease shows no cause, and has left no trace either in the respiratory or circulatory systems—in fact, no trace anywhere. Where, then, shall we locate it? What is its starting-point? We may, I think, lay it down as a rule that all those diseases that leave no organic trace of their existence produce their symptoms through the nervous system."—*Page* 30, *second edition.*

While, then, we may consider it proved possible for a person to have violent attacks of spasmodic asthma without there being present any obvious structural change in the lungs, yet, after a while, the serious perversion of lung function, caused by repetition of the fits, cannot but lead to some alteration of tissue, and the microscope will probably show some granular or fatty degeneration in the air cells of the lung, though to the naked eye appearances may be normal.

Since, then, morbid anatomy tells us but little

in cases of true spasmodic asthma, we must seek our knowledge from the teachings of physiology, and from the observed phenomena of the asthmatic paroxysm, seeing that our present purpose is entirely with spasmodic asthma, presumed to be uncomplicated with any detectable lesion of lungs, heart, or other organ.

The essence of a fit of spasmodic asthma consists in tonic spasm of the bronchial muscles; these bronchial muscles being the unstriped contractile fibres which encircle the air-tubes of the lungs, just as the muscular fibres of the intestines surround those tubes with a contractile force.

The larger bronchial tubes have their cartilaginous rings as elastic spring-openers; the smaller tubes, lying nearest to the vesicular parts of the lung, have no cartilaginous rings, but are entirely muscular; and Laennec and Reisseissen, and more recently Gratiolet, have detected muscular fibres in air-tubes less than one line in transverse diameter. The contractility of these fibres under the influence of electrical, chemical, and mechanical stimuli was proved in a series of ingenious and conclusive experiments by Dr. Williams many years ago.

The muscularity of the smallest bronchi has been recently demonstrated by Prof. Rindfleisch. This observer finds that these small circular fibres form a sort of sphincter where the bronchi are continuous with the infundibula.

The fibres are capable of much elongation and rest upon a very close-meshed plexus of capillaries, which resembles the pulmonary vascular plexus.

In brown induration of the lung these muscular bands become hypertrophied.

Paul Bert, Traube, and others, have demonstrated how the respiration can be arrested by irritation of the pneumogastric or laryngeal nerves, or those supplying the Schneiderian mucous membrane of the nose.

The arrest is much more easily obtained during expiration than inspiration, and it is well known how liable asthmatic people are to an attack after an extreme expiratory effort, as in a fit of coughing or laughing.

It has been shown by MM. Valentin and Volkman that irritation of the pneumogastric, or vagus, nerve will cause contraction of the air-tubes and approximation of the ends of their cartilaginous rings, and this fact of the lungs

contracting under the influence of the vagi nerves has been confirmed by the experiments of Traube, Bernard, and Paul Bert. These matters have important bearing on the causes and phenomena of the asthmatic fit as well as on the therapeutic means we employ to relieve the same.

In ordinary expiration the bronchial muscles contract rhythmically by virtue of the resilience imparted to them by their own natural elasticity; by this action they quicken the expulsion of foul air from the lung cells, and accommodate the size of the tubes to the lessening bulk of the lung.

Dr. Douglas Powell observes, in a paper read before the Royal Medico-Chirurgical Society, May, 1876, that in thoracic repose—*i.e.*, end of quiet expiration, the contractibility of the lung is exactly counterpoised by the elastic resilience of the chest wall. This thoracic resilience, in calm breathing, helps inspiration. Salter and Powell observed that on opening the thorax, so as to allow the lungs to collapse, and thus liberate the chest wall from their traction, there was expansion to the extent of one millimetre. When this balance of tension between the elastic

lung and resilient chest wall is disturbed, then dyspnœa is the result.

Biermer observes that the bronchial muscles antagonise the muscles of inspiration, and so prevent over distension of lung. When, by frequent attacks of spasm, the nutrition of the bronchial muscles begins to fail, they no longer are able to antagonise the force of inspiration; or, by their contraction, to assist expiration, and thus that permanent condition of lung distension known as emphysema is brought about.

It seems therefore, that the bronchial muscles act during inspiration and expiration. They act with irregular vehemence in cough; with clonic spasm in whooping-cough; with tonic spasm in asthma.

Dr. Von Bamberger* lays much stress on spasm of the diaphragm as "the most frequent and the most influential, though not the only cause of spasmodic asthma;" and he alludes to paralysis of the diaphragm as causing asthma in some cases of progressive muscular atrophy observed by Duchenne. These however, would be cases of what would better be called "paralytic dyspnœa," and are similar to cases of

* Syd. Soc. "Year-book, 1865-6," p. 140.

dyspnœa resulting from impaired action of the phrenic nerves.

That the diaphragm is a muscle especially concerned in the respiratory act of inspiration is well known. The fibres of this muscle take origin from the inner surface of the cartilages, and a little of the osseous part of all the ribs which form the margin of the thorax, — that is to say, the five false ribs and the last true one; one narrow muscular slip arises from the xiphoid cartilage, and all these muscular fibres curve upwards and inwards to join the central tendon of the diaphragm.

This muscle acts in inspiration by contracting, and as a consequence it descends and becomes an inclined plane, whose direction is downwards and forwards, while the cavity of the thorax is enlarged, and that of the abdomen diminished.

In expiration the diaphragm rises, being pressed up by the contraction of the abdominal muscles, and after a complete expiration its upper surface is on a level with the lower border of the fourth rib.

In the adult male, ordinary respiration is chiefly diaphragmatic, the ribs and sternum not

moving much. While, then, we admit the important part played by the diaphragm, especially in the male, as a muscle of inspiration, careful observation, by Duchenne, Biermer, and others, tends to throw doubt upon the statement of Bamberger as to diaphragmatic spasm being the most frequent cause of the asthmatic paroxysm. In a case of tonic spasm of the diaphragm, recorded by Valette; during the fit, loud bronchial breathing was audible all over the chest; there was none of the sibilant and sonorous wheezing that attends true bronchial asthma.

Biermer, in the case of a girl with bronchitis and diaphragmatic spasm, noted also rough harsh breathing over the chest.

An actual tetanic spasm of the diaphragm cannot last long without causing death.

During the paroxysm of spasmodic asthma it is well known how the scapulæ are drawn up and the shoulders raised; while, by fixing his elbows or arms, the asthmatic gains additional expansive power on the ribs.

The hollow at the epigastrium, and the distress often complained of there, show the efforts the diaphragm is making to expand the chest below.

Despite all these straining efforts of the

thoracic muscles air cannot be got to enter the lungs; these organs are spasmodically fixed, and the small tubes and air cells will not act in unison with the muscles of inspiration; hence the distressing want of breath, and hence all the external straining which we behold during a paroxysm of asthma. More or less of air may be imprisoned within the air-cells, but the further interchange of air in the ordinary process of inspiration and expiration is well nigh entirely arrested and at a standstill.

The fixation of lung during the asthmatic fit was well proved by the observations of Bamberger, in one case where neither inspiration nor expiration exerted the slightest influence upon the limits of the lower borders of the lungs. During the deepest inspiration the upper limit of hepatic dulness did not vary the breadth of a line from its position during the deepest expiration.

When respiratory arrest is complete, symptoms of asphyxia, with livid face, come on, as when a person inhales deadly gas; but when things seem at the very worst the paroxysm yields, possibly in consequence of the carbonic acid accumulated in the blood acting as an anti-spasmodic, or, as some think, as an exciting agent

to the terminals of the pneumogastric nerve, and thus by reflex action determining inspiration; thus the impending asphyxia brings relief to the sufferer.

Having thus briefly sketched the nature and mode of production of the asthmatic paroxysm, I do not enter upon any discussion of the various theories that have been put forth. My purpose is mainly to offer some remarks on the treatment of the different varieties of asthma, and for a complete history of the complaint, and of all the views that have been held concerning it, I must refer my reader to the complete and well-known treatise of Dr. Hyde Salter.

I am satisfied to make the distinguishing mark of asthma to be a spasm, or cramp, seizing on the muscular fibres which encircle the small bronchial tubes, and which we call the bronchial muscles. In asthma these muscles remain spasmodically fixed, and so will not let air in or out of the lungs, though the muscles of the trunk of the body are straining their utmost to expand the chest and promote respiration.

In some respects asthma is to the lungs what colic is to the bowels, or angina pectoris to the heart; it is in fact a form of muscular cramp,

and when we know exactly what muscular cramp is, we shall be a step further in our knowledge of the pathogenesis of asthma.

The spasmodic fixing of the bronchial muscles explains the inspiratory and expiratory difficulty so characteristic of spasmodic bronchial asthma.

More or less air is pent within the cells of the lung; it may become rarefied, and so stretch and expand these cells, while the patient feels his chest tense and distended so that he has to loosen his clothes. The stoppage of breath movement by spasm checks also the circulation in the minute vessels; hence acute swelling of the mucous membrane of the bronchioles, with flux and mucous catarrh; and, as this mucus collects before the spasm has yielded enough to enable the patient to discharge it by expectoration, crystals of mucine have time to form, and these may be seen in the mucus (as Leyden has proved) mixed with cells and granular matter.

I am aware that this theory of the asthmatic fit being due to a spasmodic setting, or contraction, of the bronchial muscles has been controverted by some; but I could never make any other theory in any way accord with observed

facts; neither could my valued friend, the late Dr. Hyde Salter, who had seen more of asthma than anyone probably, and who told me not long before his death that he held as firmly as ever to the theory of bronchial spasm as best explaining a fit of asthma.

Since a free and regular circulation of the blood must depend, for one condition, on the right composition of this fluid, anything that impairs the normal composition may become a cause of irregular circulation. It has long been observed that many asthmatics are liable to be attacked by their complaint some time not long after a meal, especially if the food taken should have been of unwholesome kind. In these cases we can with much reason attribute the attack of asthma to some irritating matter formed in the blood, which, as it circulates through the fibres of the bronchial muscles, throws these into a state of spasm. The morbid matter of gout, rheumatism, or of any other diathetic disease circulating in the blood, may thus cause asthma. To this form of asthma, arising from the circulation of disordered or diseased blood, the name of *Hæmic asthma* has been applied. The asthma of Bright's

disease may, I think, be placed in this class, though Hertz and Rosenstein consider this uræmic asthma to be due to œdema of bronchial mucous membrane. Pressure upon, or spasm of, the small arterioles may be the cause of such œdema by obstructing the circulation.

In a different class of cases the asthmatic fit may come on so instantly on the reception of unwholesome food by the stomach, or on the application of cold, or other excitant, to the body, that we cannot attribute the conveyance of the irritation to the lungs to the channel of the blood, and we consider in these cases the nerves to be the media through which the impression is conveyed to the lungs, and bronchial spasm induced. Uterine irritation, a loaded state of the stomach or bowels, a sudden draught of cold air, a dash of cold water over the foot, or uncovering the chest for stethoscopic examination, may cause this description of asthma ; and it may be described as *Reflex asthma*, since the irritation is reflected from its seat to the lungs through the medium of the nerves.

In *Centric*, as distinguished from Reflex, asthma the source of morbid nerve excitation lies at the respiratory centre of the medulla oblongata.

In another group of cases the cause of the asthmatic paroxysm is found in the air which the patient breathes; this may act as a direct irritant, and provoke spasm in the bronchial tubes, just as undigested food may cause gastric or intestinal spasm. In this class of cases may be placed instances of *Specific asthma,* arising from the smell of hay, or from any special vegetable or animal emanation.

This classification appears to embrace all cases of pure uncomplicated spasmodic asthma, and on it a rational plan of treatment must be based.

Bronchitic, emphysematous, and cardiac asthma stand in another category as instances of complicated or organic asthma, and are treated of in the latter part of this book.

CHAPTER II.

Reasons for viewing spasmodic bronchial asthma as a nervous disease.—Dyspnœa sometimes due to paralysis of the bronchial muscles.—Brief description of an ordinary fit of asthma.—Particular varieties of asthma described by Wunderlich and Flint.—Diagnosis of spasmodic asthma from the dyspnœa due to organic brain disease, or to pressure of intra-thoracic tumours.

We have seen in the foregoing chapter that spasmodic bronchial asthma is essentially a nervous disease, due to spasm affecting the muscular fibres which encircle the smaller bronchial tubes.

Experiment has shown that the spasmodic arrest of the respiratory act, which constitutes asthma, may occur during expiration or inspiration as a result of nerve irritation. The first kind of arrest is the one most readily induced.

The arrest * takes place in that phase of the

* "Jahresbericht uber die Liestungen in der Medicin," 1869, p. 125.

respiratory act during which the nerve irritation is applied, and a more powerful irritation is required to produce stasis in inspiration than in expiration.

That asthma, *in the sense of difficulty in the breathing*, may occur from a paralysed, rather than from a spasmodically contracted state of the bronchial muscles, is a point to be adverted to presently. Usually, though not necessarily, this paralytic dyspnœa is connected with some amount of organic affection of the lung tissue; but that we may have either spasm or paralysis of the bronchial muscle causing asthma, is to me as clear as that we may have spasm or paralysis of the muscular coat of the bladder, leading alike to retention of urine.

In further proof of the nervous nature of asthma we have the suddenness with which the attack comes on, and the absence of premonitory symptoms pointing directly to the lung, such as cough, expectoration, or bronchitis. Salter has seen a complete fit of asthma developed in half a minute, and I have seen an intense fit come on in exactly three minutes. Nervous excitement will *cause*, and not unfrequently *cure*, a fit of asthma; and we hear all the sonorous

and sibilant wheezings, which have filled the chest during the fit, subside into natural respiration as the spasm yields. Dr. Langdon Down has informed me of the case of a lady who had asthma on viewing one particular picture in the Royal Academy Exhibition. All these matters attest the nervous nature of the seizure.

The phenomena of the actual asthmatic fit are familiar to most persons. The attack may come on at any period of the twenty-four hours, though commonly it appears towards early morning; its invasion may wake the patient up suddenly from his sleep, or, after waking with a sense of tightness and distress about his chest, the sufferer finds the symptoms increase till he is obliged to sit up, leaning forward, with raised shoulders, bent back, his elbows on his knees, or else his hands grasping some fixed point, the better to enable the muscles of the shoulders to act in expanding the chest.

Much distress is felt at the pit of the stomach, due to the contraction of the lower ribs and diaphragm. The speech is short, husky, and hardly audible.

The countenance of the asthmatic betokens his distress from want of air; the eyes are

prominent, the face red and congested, or else livid and damp, with a cold clammy sweat.

The pulse at the wrist is remarkably small, from the scanty quantity of blood passing through the heart in consequence of the stoppage in the lungs.

The upper part of the thorax is, as a rule, in a state of extreme distension, and resonant on percussion; but at times, in extreme contraction of the lung, percussion resonance is diminished. On watching the breathing it is observed to be difficult, sometimes slow, not more than nine or ten respirations a minute, at other times very hurried, and in one fit which came on suddenly and rapidly I counted the respirations as many as sixty in the minute. Expiration is markedly prolonged, being often four or five times as long as inspiration. Cough, if present, is short and difficult.

On listening to the chest no healthy breathing can be detected; the chest seems full of sonorous and sibilant sounds in the air-tubes, which are constantly changing from one part of the chest to another; rarely are moist sounds heard, and the dry sounds just described are dependent on spasmodic narrowing of the bron-

chial tubes, and are not changed by coughing.

After lasting usually some hours, the attack subsides, with or without expectoration of mucus, sometimes frothy, sometimes thick, and at times in small dark lumps or pellets. Expectoration is present or absent, according as the case is one of "humid" or "dry" asthma. The urine after the attack is turbid often with lithates, but during the paroxysm it is watery and pale. In the case of emphysematous patients, crystals of oxalate of lime can often be found in the urine.

While the description I have thus given of the asthmatic paroxysm will serve as a general one in most cases, it must be remembered that cases may be met with now and then in practice which are true cases of asthma, and yet do not in every particular correspond to the standard descriptions given of that complaint.

Wunderlich has described a rare form of asthma, consisting of an attack of gradually increasing dyspnœa, reaching its maximum of intensity in two or three days. At this stage the chest is motionless, fully resonant, and in a state of extreme distension, while the heart is

thrust down into the epigastrium, and the liver pushed down in the abdomen.

To me it appears that in these cases the human subject must breathe something after the manner of a reptile; inspiring small gulps of air, and scarcely allowing any expiration, till the lungs become distended with the pent-up air to such an extent that the heart and liver are pushed down in the way described.

Certain it is that the effect of these kinds of attack must be to distend the air-cells of the lung to an unnaturally large size, thus making the human lung like to that of a turtle or other reptile.

Dr. Flint, of America, has noticed attacks of asthma associated with elevation of the diaphragm and drawing-in of the lower end of the sternum, as if the lung were powerfully contracted and contained but little air; indeed, Dr. Flint says,* quoting Dr. Walshe, that in some of these cases the volume of the lung may be so much reduced as perceptibly to diminish the clearness of the percussion note. This is the reverse of the state described by Wunderlich, and is a state of lung not often demonstrated,

* "On Resp. Organs," page 364.

though its possible occurrence early in the asthmatic fit is easily understood, and should be borne in mind: it is a condition which, as far as impaired percussion note goes, is not likely to be found where the lungs are emphysematous; whereas that distension of lung from want of contractile power described by Wunderlich will probably be found connected with more or less emphysema, which will be increased the oftener the attacks are repeated.

These variations in the condition of the chest in a fit of asthma serve to explain the differences met with in some of the treatises on medicine, in the descriptions they give of the state of the thorax and abdomen during the fit.

A word may be here said respecting the diagnosis of asthma, a matter of consequence in respect to treatment, and not always so plain as may at first sight appear.

Disease of some parts of the base of the brain will cause attacks of "subjective dyspnœa" that have been mistaken for asthma.

Cases of asthma have been recorded by Gairdner, Heberden, and others, due to organic disease of the brain, and to tumours involving a pressure on the vagus nerve. I have myself

observed a case of severe and long-standing dyspnœa due to a tumour pressing on the upper part of the spinal cord. Attention should be paid to the pulse rate in cases where there is reason to suspect pressure on the vagus nerve, for experiment has shown that irritation, or compression, of this nerve will in a marked way reduce the rapidity of the pulse.

Dr. Hyde Salter was once called to a distance from town to see an eminent provincial physician ill with attacks resembling asthma, but when examined respiration could be distinctly heard in the chest. This fact, taken with the previous history of the case, pointed to cerebral disorganisation as the true disease, and of this the patient shortly after died.

Attention has been drawn by Fonssagrives and Woillez to attacks of severe paroxysmal dyspnœa, occurring commonly in males from the ages of twenty-four to forty-two, due to engorge- of the bronchial glands. The engorgement may be a simple hypertrophy, or it may arise from tubercular or cancerous disease. The lung symptoms may be thus summed up:—A dry, paroxysmal, suffocating cough; increasing dyspnœa, accompanied by paroxysms of suffoca-

tion,—and during these attacks the respiration is jerking and irregular, and the voice feeble or extinct; percussion sound clear,—the intra-scapular and upper sternal regions should be carefully examined on this point; palpation detects increase of the normal thoracic vibrations, and under one or other of the clavicles *frottements,* due to large sonorous râles, audible at some distance, are perceived, and are of much importance. The subacute steady progress of the disease confirms its diagnosis, and its duration varies from fourteen days to six months.*

Bronchial phthisis or tuberculosis of the bronchial glands in children is sometimes a cause of asthmatic fits. The gland may become as large as a good-sized apple, and may by pressure cause well marked venous swelling and congestion. Bleeding from the nose may occur, and pressure of an enlarged gland on the azygos vein has been known to cause hydrothorax. Percussion in the three upper interspaces may elicit a "crack-pot note:" this is caused by the air containing lung being compressed against the enlarged glands.

With the asthma in these cases there is

* Sydenham Society "Year-Book," 1861, p. 193.

usually a short dry paroxysmal cough, without any whooping or expectoration; there are paroxysms of dyspnœa at night, with febrile accessions, sweating, and emaciation; and, occasionally, examination by percussion of the intra-scapular and supra-sternal regions discloses limited dulness in these parts.

When a child has asthma, and with it most or all of the above symptoms, there is very good reason to think that the paroxysm is due to pressure of an enlarged bronchial gland.

Rarely these cases come to a climax and a cure by the child suddenly expectorating purulent matter; this continues for a time, then suddenly ceases, the excavated gland cicatrising and healing.

A small aneurismal tumour within the thorax, pressing on the recurrent nerve, has been known to cause violent spasmodic dyspnœa, with intervals of relief, as in a case of Dr. Barker's in the "St. Thomas's Hospital Reports for 1870." In the Pathological Society's "Transactions," vol. xxiv., p. 33, Dr. Dickinson has recorded a case where the right bronchus was compressed by a lymphoid growth, and where the first symptoms complained of were those of asthma

The occurrence of cases of this description, show the importance in all cases of asthma of examining for undue fulness of veins, for flattening and dulness at any part of the chest, and for evidence of unexpanded lung. The condition and position of the heart should also be fully investigated.

CHAPTER III.

Investigation of a case of Asthma.—Diagnosis from dyspnœa due to affection of nasal passages, throat, and larynx.—Tracheal and laryngeal Dyspnœa.—Prognosis in uncomplicated Asthma, usually favourable.

In examining a patient who complains that he has asthma it is important to examine well the throat and see what is the condition of the fauces, uvula, and tonsils. In the case of a child it often happens that a severe nocturnal dyspnœa, of paroxysmal type, is due to enlargement of the tonsils. In other cases a polypus of the nose has proved the cause of severe breath difficulty on lying down, that resisted all treatment till the polypus was discovered and removed by the surgeon. Congenital enlargement of the thyroid gland may be a cause of asthma, but I have seen this gland much enlarged without anything like severe

asthma being induced, while, sometimes, a small cystic enlargement that probably presses on some branches of the pneumogastric nerve will cause marked and troublesome asthma.

Certain laryngeal affections—as, for instance, paralysis of the abductors (crico-arytenoidei postici) of the vocal cords, giving rise to dyspnœa and stridulous breathing—must be distinguished from asthma by a laryngoscopic examination, when it will be seen that the vocal cords scarcely separate in inspiration, as they ought to do in a healthy larynx.

An example of this laryngeal asthma is seen in that nervous affection of young children known as "Thymic Asthma," "Kopp's," and "Millar's Asthma," and also as Laryngismus Stridulus; and before pronouncing a child in its first year to have congenital asthma, it is as well to see that the case be not one of laryngismus stridulus.

In laryngismus stridulus, or laryngeal asthma, the adductor muscles of the vocal cords are spasmodically contracted, so that they more or less completely close the laryngeal opening. The cause of the laryngeal spasm is not more clear than are the causes of bronchial spasm, but the disease is well known to be most common in

children during the first years of life. It may be due to teething, to pressure on nerves of larynx by enlarged glands, or to any other source of reflex irritation.

The careful observations of Hérard have proved that the disease is not due to enlargement of the thymus gland. This observer found that in six children dying of the affection, the gland weighed from half-a-drachm to a drachm in five, and four drachms in the sixth. These cases show that the the thymus gland varies greatly in weight in different subjects attacked by the disease. In fifty children who did not die of laryngismus stridulus, Hérard found the thymus gland of the same size and colour as in those who died of the disease.

Dr. Coley has recorded a fatal case where all the glandular structures were healthy, but an exostosis pressed on the cerebellum.

In the attack inspiration is noticed to be very harsh and prolonged, with stridor and crowing noise; as the spasm increases to a complete closure of the glottis, all respiratory movement ceases, the larynx works convulsively up and down, the head is thrown back, the features get livid, and suffocation is imminent.

Throughout there is not any fever, but in very severe cases general convulsions may come on with livid face and swelled jugular veins.

Adults sometimes get attacks of laryngeal spasm and dyspnœa; doubtless often called asthma till the laryngoscope enabled us to ascertain their true nature. In true bronchial asthma the glottis always remains free and unaffected by the spasm.

In the laryngeal spasm of adults the vocal cords, viewed by the laryngoscope, are spasmodically adducted, and so the glottis is closed. The obvious result of this is to cut off the supply of air to the lungs. Inspiration becomes long, laborious, and marked by stridor, while the soft and yielding parts of the chest wall, at the supra-clavicular and intercostal regions, fall in and are depressed in consequence of the non-inflation of the lung. The movement of the larynx and the prolonged inspiratory character of the dyspnœa, aid to distinguish these cases from ordinary asthma.

Prolonged inspiration of very high pitch, with feeble breath sound in lungs, would also occur in case of tracheal stricture, independently of laryngeal affection.—*See* case of Dr. Morell

Mackenzie's in the Pathological Transactions, 1871 p. 33.

In the *Lancet* of January 23rd, 1864, is reported with illustrations of the *post-mortem* appearances, a case of laryngeal and tracheal obstruction that came under my notice at Victoria Park Hospital. The harsh laryngeal stridor in inspiration was marked while the breath sounds in chest were feeble, and the supra-clavicular spaces fell in during inspiration.

From these symptoms I diagnosed laryngeal dyspnœa, and Sir Duncan Gibb, who examined the patient and reported the case, clearly made out the obstruction to be caused by growths impeding the movement of the vocal cords. After death both larynx and trachea were found much obstructed by growths and deposit. In laryngeal dyspnœa expiration is not often prolonged unless the obstruction exist below the glottis. In glottic œdema inspiration is prolonged and hissing; expiration short and easy (Pitha).

Expiratory stridor has been observed by Dr. Fuller in cases where the trachea has been compressed by enlarged bronchial glands. The sign is important in distinguishing these cases from those of true croup. Where expiration and inspi-

ration are alike prolonged and difficult, there probably exists some laryngeal paralysis. This condition of laryngeal paralysis is well illustrated by the following cases.

CASE I.—Mrs. M., æt. 42, has attended at Victoria Park Hospital since 1862, being then under the late Dr. Ingram. She has suffered much from chronic rheumatism, with bronchitis and asthma. Her mother died of asthma, and her father died at the age of 67 of some disease of the chest; for many years she has considered herself the subject of asthma.

During the autumn of 1869 this patient's breath difficulty increased greatly, and none of the ordinary remedies gave her relief. Inspiration was noted as noisy and difficult, expiration was also difficult and prolonged. Chest resonance was good, but breath sounds were weak everywhere, as there was but little movement of air in the tubes. Heart sounds normal.

To see the larynx in the mirror was not easy, but on October 30th it looked to me congested and swollen, with much mucus about it. Subsequent examination satisfied me of something abnormal about the cords, and at my request Dr. Morell Mackenzie examined the patient with me in March, 1870; and though there was a good deal of mucus about the throat with congestion, and great irritability, yet, when this had been subdued by the use of ice, it was made out that there was paralysis of the abductor and adductor muscles of the left vocal cord, so that this cord

remained immoveable, and interchange of air in the chest was a matter of great difficulty.

The attempt to cough or sneeze was peculiar and characteristic in the sound produced, in consequence of inability to close the glottis.

I made a note in this case of the absence of depression of the supra-clavicular and intercostal spaces.

The patient had one or two attacks of hæmoptysis, but the most careful examination failed to detect any sign of intra-thoracic tumour. Under the influence of quinine and belladonna her symptoms were much relieved, but I regret to be unable to say what became of her eventually. In May, a note was made that she is unable to sound a true cough, but at that date her chief complaint was of her chronic rheumatism.

Case II.—Henry A., æt. 39, seen at West London Hospital, March, 1873. Patient is deaf, with a pale anxious countenance, and for the last two months has complained of great difficulty in his breathing; constant, and not notably affected by times or seasons. Chest resonant on percussion, some coarse râles very distinct on left side; audible also on right. Breath movement in larynx and trachea very feeble; cannot form a proper cough sound when requested to do so. On hearing this history, I examined him with the laryngoscope, and observed no movement whatever of the left vocal cord. Iodide of potassium was given, but no relief ensued from treatment during the very short period which he attended the hospital. I was not able to prove here the existence of any

intra-thoracic tumour as a cause of pressure on the recurrent laryngeal nerve.

In the instance of a lady whom I saw but two or three times during her stay in London, there was extreme dyspnœa, with prolonged expiration, loss of voice, and dry cough, all of which symptoms improved after she had expectorated a complete cast of the trachea, reported to me as being seven inches long, and bifurcated at one end.

The foregoing observations may be of use in directing the attention to the pharynx and nasal passages, as well as to the laryngeal and tracheal regions, when investigating cases of presumed spasmodic asthma.

A sense of tumefaction and of fulness about the nose is not uncommon in asthmatic persons; and I have known it subside as the asthma got better. The probable cause is some œdema of the mucous membrane from vaso-motor paralysis. In the fit of asthma there has been observed by Storck, in tracheoscopic examination, a general hyperæmia and congestion of the tracheal mucous membrane; so these symptoms and appearances need not be regarded as unusual in ordinary asthma. When, however, observation of the patient during the fit shows slow prolonged and difficult inspiration, falling in of the soft part of the thorax, upward and

downward movement of larynx, feeling of thrill over trachea or chest, then it becomes of consequence carefully to examine the larynx, and carefully to percuss and auscult the chest to see if there be, in the first place, any laryngeal paralysis or obstruction; and, in the second place, to discover if there be any sign of a tumour within the chest, which, by pressing on a nerve may cause the laryngeal symptoms.

It will be sufficient to remind the reader that the dyspnœa attendant on heart disease must not be taken for asthma; and though there is a recognised form of asthma due to uterine congestion or irritation, it is scarcely likely that any practitioner, meeting with a case of "cardiac apnœa" in a woman in child-bed, will fail to recognise the danger and gravity of the case before him, and not imagine he has merely to do with sympathetic asthma.

The prognosis in asthma is generally good, and asthmatics are well known to be, as a rule, long-lived; so that invalids who may have been for some time suffering in the chest are wont to feel much satisfaction and comfort when they are assured that their complaint is "only asthma," or is likely to "turn into asthma." The comfort

taken by the patient from these assertions is quite legitimate, the truth in these cases being that some lung mischief of a bronchitic, or even of a tuberculous, nature becomes arrested. In the healing process by which the arrest takes place the apex of one lung may become adherent to the chest wall, as is not very rarely observed in arrested consumption; or there may remain thickening of lung tissue or enlargement of bronchi, all causes of attacks of difficulty in the breathing, with accession of cough and expectoration under the influence of atmospheric changes, and yet conditions by no means incompatible with an average duration of life.

Spasmodic asthma, uncomplicated with organic disease, is seldom fatal, but persons have been known now and then to die in the asthmatic fit as from syncope.

Usually, when asthma destroys life, it is by inducing dilatation of the heart with emphysema and congestion of the lungs; and as those advanced in years are more prone to these organic changes than young persons, we always look with some anxiety at the case of an elderly person who begins to show signs of asthma. Not long ago I had under observation a gentle-

man, aged sixty-four who had become subject to very severe attacks of catarrhal asthma. He had, shortly before I saw him, been assured by more than one of the best authorities in London that he was free from any structural disease, and one physician went so far as to say that the life was one he would not hesitate to recommend for assurance. Gradually, during three subsequent years, the patient's heart became dilated and feeble, and this condition proved ultimately the cause of his death. In young persons who are attacked with asthma the prognosis, though often favourable, must be given only after repeated examinations, and more or less prolonged observation, for asthmatic fits in early life, especially if connected with enlarged bronchial glands, may prove the heralds of miliary tubercles in later years. Some months ago I saw a very rapid development of active phthisis take place in a youth who from infancy had been liable to asthmatic attacks, and since publishing the last edition of this book I have met with some well-marked instances of persons who during childhood were said to have been bad asthmatics, and who have come under my care in consequence of pulmonary tuberculosis of active kind.

Feverishness, with increase of temperature and pulse rate, occasional hæmoptysis, and a constantly greater manifestation of physical signs in one lung more than the other during the asthmatic fit, are signs that would lead us to fear the commencement of pulmonary tuberculisation.

CHAPTER IV.

Dry and moist asthma.—Nature and source of the secretion which takes place.—Hæmoptysis rare; source of the bleeding when it does occur.—Nervous nature of catarrhal asthma.—A case from Professor Trousseau in illustration.—Nature of hay asthma.—Asthma as contrasted with phthisis.—Resemblance between asthma and epilepsy.—Asthma an hereditary disease, alternating often with such diathetic diseases, as gout, rheumatism, and some skin affections.—Influence of age in determining prognosis.

ALTHOUGH mention has been made of *dry* as distinct from *moist* asthma, yet it is rare to find an attack of asthma pass off without some mucous flux from the air-tubes. When this secretion commences it is a sign that the fit is subsiding, and as the patient begins to cough up small pellets of grey or gelatinous mucus, he gets relief, and breathes more freely.

The secretion appears to be an exudation from the bronchial venules, resulting from the congestion of blood in these vessels caused by the con-

tinued muscular spasm to which they have been subjected; for though a very short attack of asthma may terminate in mucous expectoration, yet when the fit has lasted longer the expectoration is more copious and persistant, and in it may be seen the small spicules to which attention has been already drawn.

It is rare for hæmorrhage to take place from the lungs in asthma, but it does sometimes occur, and then it is the bronchial venules that furnish the blood which is expectorated.

When the expectoration, which commonly terminates a fit of spasmodic asthma, is so constant and copious as to become a special point of notice in the case, we have before us an instance of moist or catarrhal asthma; a form of the complaint consequent usually upon a persistence of dry asthma, and often associated with more or less of chronic bronchitis.

In hay asthma, called also summer catarrh, we see an example of catarrhal asthma; so we do also in the asthma due to inhaling ipecacuanha powder, or any other emanation by a susceptible person. The late Professor Trousseau believed catarrhal asthma to be much more common with children than with adults, and quotes a very in-

teresting case of a child who had at times all the symptoms of broncho-pneumonia come on with great suddenness, so that in the short space of one hour abundant subcrepitant rhonchi could be heard all over the chest. The first time Trousseau was called to see this child he treated him energetically with blisters, and in three days the child was well. A few months after a similar attack occurred, and though no active treatment was employed, the child recovered in forty-eight hours. Reflecting upon this rapid recovery, and considering that the mother of this child was very liable to hysteria, Trousseau made up his mind that the attacks were due, not to broncho-pneumonia, but to spasmodic asthma, and the next time he was called to treat his little patient the Professor advised the burning of stramonium leaves in the room; this was done, and the child was perfectly well on the next day. This, therefore, was a good example of pulmonary neurosis attended with bronchial secretion, the presence of which had been revealed by the fine subcrepitant mucous rhonchi heard.

Hay asthma is a pulmonary neurosis attended with a profuse flux from the mucous surfaces, and though the complaint may be excited by a

cold, yet commonly it so suddenly gains the acme of its intensity, with sneezing and profuse running from eyes and nose, that it is impossible to view it as other than a true catarrhal neurosis.

I have observed cases of asthma where the catarrh seems to alternate with the dyspnœa; one day the patient wants to know what is to be done for the catarrh, and next time the catarrh is gone,—*cured*, perhaps the patient will say, by something he has been taking, but now the breath is worse than ever. As a sign how little these neurotic attacks are connected with inflammation, there are instances recorded of asthmatics who have actually contracted a sharp attack of bronchitis, and during the course of the complaint have never been troubled at all with their asthma. A striking illustration of this fact has come under my observation while I have been engaged in writing these pages.

The nature of the asthmatic fit, its suddenness of invasion, its prevalence in the heat of summer rather than in the cold of winter, its occasional subsidence, even during an actual attack of real inflammation, confirm us in our view of its essentially nervous nature.

The remarkable histories we have of asthmatic

persons fighting for breath in one locality, and perfectly healthy and well almost the very instant they remove to another, further attest the neurotic character of the complaint: the forces and powers are strangely perverted and out of order in asthma, but the tissues themselves are healthy and unchanged. In these respects how powerfully asthma contrasts with pulmonary phthisis! In asthma we see marked and alarming symptoms, and yet there exists no tissue change; in phthisis, with obscure, faintly marked external signs of disease, we may have dangerous tuberculisation of lung tissue taking place.

Asthma resembles epilepsy in being prone to be excited by any irritation of the system. At times the attacks cease altogether, and it is hoped that the last drug prescribed has cured the complaint, till a sudden return of the attack under the influence of some little excitement dissipates the pleasant illusion. Asthma too, like some forms of epilepsy, may be due to the suppression of a skin eruption, or to gouty or rheumatic poison circulating in the blood.

In proof of the hereditary and constitutional nature of asthma, it is not difficult to adduce instances where children, whose parents have

been liable to gout, have been at a very early age attacked with asthma; and these cases of constitutional or diathetic asthma are most troublesome to deal with. In one case of a boy aged thirteen years, who had well-marked attacks of catarrhal asthma, it happened that, during one period of unusually severe suffering from cough, expectoration, and difficulty of breathing, the attack seemed to terminate in a true purulent expectoration which, after lasting a week or two, ceased completely and abruptly, while careful auscultation gave evident sign of a small cavity in the situation of the bronchial glands at the root of the lung. The recovery here was perfect, but the liability to asthma, during the summer more especially, remained as inveterate as before. The parents of this patient had both suffered from gout. Since writing the first edition of this book I have met with a perfectly typical case of spasmodic asthma, in a youth, in whose family gout is hereditary.

Trousseau has recorded the case of a Moldavian boy, aged five, who had very distinct fits of asthma, together with some pulmonary emphysema. In his family history there was

no mention of gout or rheumatism, and yet two years later this boy had an attack of unmistakable gout in the big toe. During the attack of gout the boy had not a single paroxysm of asthma.

In two cases of well-marked asthma occurring in a brother and sister, and referred to further on, the disease was hereditary; and in the sister the attacks became less frequent and severe when the eruption of psoraisis appeared on her wrists and arms. The brother, too, was liable to an eruption on the skin. I once attended a little girl who had bad eczema of the skin; and when this was cured, well-marked asthmatic attacks came on.

Often, when asthma comes on in young children of four or five years of age, it is due to an attack of bronchitis or whooping-cough. Examination of the chests of these children will probably reveal signs of emphysema about the apices of the lungs caused by the violent paroxysms of cough driving the air into the upper part of the lungs, whence it cannot escape owing to closure of the glottis.

Under these circumstances of local origin we may look to the child growing out of the disease.

It is curious to observe how early in life true asthma may make its appearance. Dr. Salter observed eleven cases in the first year of existence, and sixty during the first ten years of life. From ten to twenty years the number of cases occurring was thirty; and from thirty to forty years, forty-four; the numbers then diminishing rapidly during the following decades of existence. Men seem more liable to asthma than women. Of one hundred and fifty-three asthmatics, one hundred and two were males; and of fifty-eight, recorded by myself, thirty-seven were of the male sex. In examining an asthmatic child care should be taken to see that the dyspnœa is bronchial and not laryngeal; and an opportunity should be obtained of examining the small patient when free from actual dyspnœa, to see if there be any sign of tuberculisation of the bronchial glands, or of emphysema of the upper part of the lungs, with contraction and imperfect expansion of the lower parts. Emphysema and asthma are both diseases of proved hereditary nature, but either may exist independently of the other.

When asthma develops early in life and independently of any whooping-cough or bronchitis,

we may assume that the constitutional or diathetic tendency to the disease is strong, and all the resources of medicine, climate, and regimen must be set in force, in the hope to see the child outgrow the tendency to the disease. Sometimes the constitutional proclivity to asthma does not manifest itself till the age of eighteen or twenty, and then on going into some new locality, the individual is suddenly attacked with a fit of asthma, and wonders what is the matter with him; he suspects he has taken a cold till additional experience causes the real truth to dawn upon him.

A patient, sent to me by Dr. Kavanagh, of New Cross, had asthma attack him suddenly just in the way above described, at the age of sixteen, when he chanced to be at Freshwater, in the Isle of Wight. This gentleman, when a child, had a troublesome eruption on the skin, which, after some time, disappeared, apparently to make way for the asthma.

In those cases where constitutional but uncomplicated asthma first appears in adult life, the prognosis is less favourable than when it comes on in babyhood, as the tendency to tissue change increases with age.

In those advanced in life asthmatic attacks are commonly due to some organic change in the lungs or heart, and though much relief may be afforded by treatment, yet a permanent cure is very doubtful.

CHAPTER V.

Treatment of dry and catarrhal asthma.—Position, atmosphere, and other measures to prevent the invasion of the fit.—Inhalations of chloroform and nitrite of amyl.—Value of counter-irritants.—Thapsia plaster.—Oil of mustard.—Burning of various kinds of medicated papers and cigarettes.—An economical inhaler for the burning of medicated powders.—Use of internal remedies during the fit of asthma.—Tinctures of Datura Tatula, Stramonium, Belladonna, Sumbul, Cannabis —Use of chloral, &c.—Perles of ether.—Hypodermic injections.

ENOUGH has now been said as to the nature and causes of spasmodic asthma to show on what principles our treatment must be based—be it for purposes of prevention, alleviation, or cure. We must not lose sight of the essentially nervous character of asthma, even in its catarrhal form, and our treatment must be rather that for a spasmodic neurosis than for an inflammatory catarrh.

This spasmodic neurosis may be of a centric character; that is, it may be due to some irritation, or diseased action, in the cranium about the respiratory centre in the medulla oblongata. In such a case the irritation of the pneumogastric, or vagus, nerve at its origin will cause spasm of the bronchial muscle and arrest of respiration, just as occurs when the nerve is stimulated artificially by experiment. Secondly the terminal filaments of the pneumogastric distributed to the bronchi may be irritated by congestive swelling or inflammation of these tubes, or by the contact of air that is cold, damp, or charged with certain specifically irritating bodies, as ipecacuanha powder or the pollen granules of certain grasses. The irritation so caused is propagated to the nerve centre, and respiratory spasm is the result.

Thirdly, irritation of the pneumogastric in the stomach by acid or indigestible food, or irritation conveyed to the pneumogastric by the nerves distributed to the skin, intestines, bladder or womb, may determine that spasm of the small bronchi which constitutes asthma.

There are certain sensations, the meaning of which the tried asthmatic soon learns by painful

experience rightly to interpret, which show that a fit of asthma is coming on. Thus, the individual may be irritable and restless, or perhaps heavy for sleep; often there is itching of some part of the body, as, for instance, of the nose or eyes, and a peculiar itching under the chin is a marked premonition of the asthmatic seizure. In a lady aged thirty, liable to very severe catarrhal asthma, itching under the chin and the appearance of an erythematous rash on the chest usually ushered in the attack. In another case a feeling as of a tight stirrup across the instep was the usual warning. In some persons flatulence and dyspepsia precede the fit, though the diet has been discreet and simple.

The best methods for averting a threatening attack of asthma are to some extent matter of individual experience, but yet there are certain general principles which will guide us in dealing with all cases. We should try to promote the respiratory action by placing the patient with his elbows and arms resting on some fixed point, so that the muscles of the arms and shoulders may help to expand the chest. Sometimes emotional excitement, or a strong effort on the part of the patient, whereby the

attention is diverted, will avert the paroxysm. In one case, in my experience, a patient was leaning against the side of a river steamer, fighting laboriously against an attack of asthma, when suddenly the boat came into collision with another steamer and was in peril of sinking. The patient lost his asthma at once, and was able to exert himself for his own safety and that of those around him. Dr. Salter tells of a case where a lady could stave off her asthmatic fit by sitting down to the piano, and of another instance of one who had his asthma stopped by being put on a horse which ran away with him. Seeing how profoundly asthma is influenced by atmospheric conditions, it is well for the asthmatic, provided he be yet able to move, to try getting from one room to another on a different level, or to go out of doors. If he suffer specially in a dry air, then let the air of his room be made moist by having a kettle placed on the fire, and allowing the steam to escape into the air of the chamber.

The movement of the diaphragm in expanding the chest is very greatly dependent on the condition of the abdominal viscera. Fabius found that purgation of the bowels by lenitive electuary

increased the vital capacity of the chest by 250 cubic centimetres.

We therefore understand how important it is that a loaded state of the stomach or bowels should be properly attended to and relieved by an emetic or purgative; and, if the feet be cold, they should be at once placed in hot mustard and water. Placing the arms also in a hot mustard bath gives ease to one of the greatest sufferers from asthma I have ever met with.

Strong counter-irritation to the surface of the chest and back is a remedial measure on which experience has taught me to place great reliance. I have known a free application of croton oil to the surface of the chest productive of speedy relief to the breathing. In another case after minute scarifications had been made over the chest and a rubefacient liniment applied, the patient assured me that, though the smarting of skin was severe, the relief to his breathing was very great. In France the Thapsia plaster is employed, and acts very energetically on the skin as a rubefacient. The plaster is made by dissolving the resin of Thapsia Garganica * in

* Thapsia Garganica is an umbelliferous plant, taking its name from the Isle of Thapsos. An account of its use in the form of plaster will be found in the *Journal de Pharmacie*, Juillet, 1868.

alcohol and then spreading the solution over a piece of waxed cloth; one coating is enough to confer on the cloth very active counter-irritant powers when applied to the chest. Ten drops of the volatile oil of mustard dissolved in one ounce of spirit of camphor, after the formula of Dr. Garrod, forms a convenient and cleanly preparation, which may be sprinkled on flannel or on spongiopiline, and so used locally to the chest. Diligent and persistent friction of the chest with the compound camphor, or soap, liniment is a measure well worthy the attention of asthmatic patients.

To one liable to gout and acidity, a draught should be given containing a scruple of bicarbonate of soda or potash, with half a drachm of aromatic spirit of ammonia, in a wineglassful of peppermint water. In another case, a tumbler half-full of *very hot* brandy, gin, or whisky, with water, may be serviceable. Hot coffee, also without milk, is a well-known and very efficacious remedy.

If, despite the employment of these means to avert the paryoxysm, it nevertheless increases, the patient's words become fewer and shorter, his face congested, and his chest difficulty very

great, he should at once resort to the inhalation of the fumes of burning nitre paper; or if this be not at hand, he need not hesitate to try a few whiffs of chloroform.

The speedy and decided relief obtained from the inhalation of chloroform in a fit of spasmodic asthma has now been long recognised. In the *Medical Times* for December, 1847, is published an interesting case, by Mr. Chandler, of a lady, aged 56, who for twenty years had been subject to attacks of spasmodic asthma, for the relief of which "the resources of the 'Pharmacopœa' had been exhausted in vain." On December 6th, after an attack of the then prevalent influenza, this lady was seized with her asthma, with extreme dyspnœa, great sense of constriction, and acute darting pains through the chest and epigastrium.

Half a drachm of chloroform was now administered on a sponge; after a time unconsciousness came on, with relaxation of the limbs, and as she lay back in bed, the inspirations became prolonged and deep, with considerable intervals.

There was no return of the spasm, and the patient remained comparatively well, feeling no ill effect from the inhalation. The vapour of sulphuric ether had been previously tried in this

case, but it seemed to increase the sufferings of the patient.

Employed with due caution at the onset of an asthmatic fit, a very small quantity of chloroform vapour will often suffice to avert the coming mischief; and, where the asthma is truly spasmodic, there seems reason to believe that this practice of checking the onset of the fit by a little chloroform may in time break through the habit entirely.

When the chloroform is entrusted to the individual patient, it may be taken in one of Bird's inhaling pipes.* Ten drops of chloroform, with half a drachm of spirit of wine or of camphor, should be poured on the felt sponge, and this inserted into the bowl of the pipe, so that the vapour may be inhaled through the tube. Should the vapour overpower the patient's consciousness, he will be almost sure to let the pipe fall from his hand; but, with the small dose of chloroform above indicated, it is not very likely that consciousness will be lost.

In a few rare instances chloroform fails to re-

* A full description, with illustration, of this inhaling pipe, will be found in the *British Medical Journal*, vol. i., 1869, as well as in the *Medical Times and Gazette* of same date. The pipe is made by Maw, of Aldersgate Street.

lieve, if it does not actually increase, the distress of the patient; and, after frequent repetitions of a large dose, the system may become less susceptible to its influence, so that the dose has to be increased till patients find themselves consuming this anæsthetic in a way that is astounding. It is always important to begin, therefore, with a very small dose of from five to ten drops on a handkerchief, or in the inhaling pipe, and not to increase the dose without good cause for so doing.

We find, sometimes, persons who have got into the habit of inhaling chloroform vapour through a hand-ball vulcanite inhaler. Air being pumped through the chloroform, and thus becoming impregnated with the vapour, forms an inhalation by no means unpleasant, but I have seen most pernicious results ensue from a habit having been formed of at once resorting to the instrument when the slightest distress was felt at the chest.

Recently the amber-coloured liquid, smelling like the essence of ripe pears, and known as Nitrite of Amyl, has been recommended as a speedy means of obtaining relief in spasmodic asthma, as well as in some forms of cardiac neurosis and spasm.

Nitrite of Amyl has been shown by Dr. Richard-

son to act by causing paralysis of the organic nerves, which govern the contractility of the blood vessels; it is, therefore, a relaxer of muscular and arterial spasm.

When five drops of Nitrite of Amyl are inhaled, there is increase of pulse rate, throbbing of carotids, with flushing and tension of the face. These effects follow in about thirty or forty seconds, the action of the inhalation rapidly causing dilatation of the blood vessels.

In some forms of angina pectoris and syncopal epilepsy, the nitrite seems useful, but its effects are apt to be unpleasant, and even, at times, alarming, The preparation loses strength by keeping, and should only be used for the relief of asthma after simpler and safer methods have been first tried. Intense pallor of face and pain at heart, are indications for the use of the nitrite, and two or three drops should be cautiously tried on a piece of lint for inhalation.

The smoke of the burning leaves of certain solanaceæ as Stramonium, Belladonna, and Tobacco, has been proved to have a relaxing effect over muscular spasm; and the value of inhalations of the smoke produced by burning leaves of Datura Stramonium and Datura Tatula in relax-

ing the spasm of bronchial asthma is well known both to the Profession and the public. The old-fashioned way of smoking the chopped-up stramonium in a pipe with tobacco is now in a great measure superseded by the cigarettes which are made with camphor and stramonium; and of these, those that are prepared from the leaves of Datura Tatula, first introduced into use by Messrs. Savory and Moore, are, in my experience, both safe and effective. Several asthmatic patients under my own care feel that the use of one of these cigarettes whenever they feel the fit impending, averts, or greatly mitigates their distress, and adds much to the comfort of their lives.

In using the fumes of stramonium for the relief of asthma, it is a good plan to take the inhalation in a concentrated form, after the plan recommended by Mr. Lawford. The herb is to be washed and dried, and then smoked, the smoke being puffed into an inverted ale-glass; when this is full it is to be placed over the mouth, and a deep inspiration taken. The result is a momentary sense of suffocation, then copious expectoration of ropy mucus and immediate relief.

The cigars made with the rolled-up leaves of the stramoninm are not so efficacious and hardly

so safe as the camphorated cigarettes; but whatever form the patient may use, it is well at once to stop the inhalation of the smoke as soon as any feeling of faintness and giddiness comes on; inattention on this point has led to serious and even fatal consequences from smoking stramonium leaves in an ordinary pipe.

In the well-known Espic Cigarette, solanaceous and other plants are combined together, according to the following formula:—*

℞ Folii Belladonnæ, gr. vj.;
,, Hyoscyami, gr. iij.;
,, Stramonii, gr. iij.;
,, Phellandrii aquatici, gr. j.;
Extracti opii, gr. ¼.;
Aquæ lauro cerasi, qs.

The powdered leaves are wetted with the ext. opii. dissolved in the laurel water, then dried, and put up in cigarettes.

I have met with patients who get prompt relief from these cigarettes, and from these alone, others having little or no effect in relieving them.

Grimault's cigarettes, which contain Indian hemp, and the cigarettes made by Mr. Slade, of Long Acre, will, in many cases of troublesome asthma, relieve when others have failed.

A patient who was always free from asthma

* Trousseau, Clin. Med., vol. i., p. 648.

when in London, had scanty glutinous sputa, and who was invariably worse in a damp atmosphere, found Grimault's cigarettes afford relief after he had vainly tried those made with stramonium.

Useful cigarettes are made of the nitre paper in the following way:

White blotting-paper is cut into small slips about seven inches long, and one and a half broad; these are soaked in a solution, made by dissolving four ounces of nitre in half a pint of hot water, then dried and rolled round a pencil to give them a cigarette form, and are at once ready for use.

The nitre paper, made with a saturated solution, can also be kept in squares ready for burning in the patient's room; often it is not until the room is well filled with the fumes of the burning paper, that the asthmatic obtains relief. In one case under my observation, nitre paper burnt in the patient's bed-room will prevent the asthmatic attack without awakening him, if one is at hand who can ignite the paper as soon as ever difficult respiration in the sleeper shows that his enemy is near at hand. In some cases of very obstinate asthma, the addition of one-quarter of a grain of arsenious acid in solution to each of the nitre cigarettes is an immense advantage; a few full

and deep inhalations from such a cigarette once or twice in the day tend to promote the permanent cure of many forms of asthma.

There are various other ways of medicating the nitre paper; as, for instance, by washing it over with the compound tincture of benzoin, or by adding to the solution some of the solution of nitrate of mercury, in such proportion as to have two grains of the nitrate in each cigarette. These balsamic and mercurial cigarettes are, however, of more marked service in some chronic affections of the throat and larynx than in asthma. Nitre paper is, I believe, the basis of the "Papier Fruneau" and "Papier Ricco," often valuable in asthma, and also of a very useful paper prepared by Mr. Dowling, of Reading, which I have used with excellent results.

The "Ozone Paper" prepared by Mr. Huggins of Temple Bar, contains chlorate of potash and iodide of potassium, and of its efficacy I have had abundant evidence. The leaves of stramonium and belladonna soaked in solution of nitrate of potash and then dried and powdered, may be burnt under the nose of the asthmatic patient with every prospect of relief to his distress. The powders sold as patent remedies for asthma, pro-

bably have some such composition as that just named, and their remedial efficacy is often very marked.

Although ammonia is not a sedative, yet at times the fumes of ammonia inhaled may break the asthmatic paroxysm. The practice of applying solution of ammonia, mixed with an equal quantity of water, on a brush to the posterior part of the pharynx, was introduced some years ago by Duclos, and he claimed to have effected wonderful cures by this practice. It is a method of treatment, according to Trousseau, to be tried with the utmost caution, for the first touch of the saturated brush on the wall of the pharynx will at times cause a paroxysm of suffocation that is dangerous and alarming, though afterwards the patient may remain for a time free from asthmatic fits.

In using any kind of inhalation, whether by pipe, cigarette, or inhaling jug, it is necessary to understand that the medicated vapour should be fairly drawn into the lungs, and not merely puffed in and out of the mouth after the method of those who smoke tobacco.

A want of attention to this point often causes patients to complain of the failure of medicated

cigarettes to give them any relief, but when they once acquire the habit of fairly inhaling the vapour, they soon see reason to alter their opinion. With the cigarettes de Joy, sold by Wilcox, of Oxford Street, brief but plain directions are given to teach the patient how to use them, and, when properly used, they are remarkably efficacious in relieving asthma in very many of its forms.

Datura Tatula pastilles, or powder of Stramonium and Belladonna leaves mixed with Nitrate of Potash, may be burned on the bottom of a plate and the fumes inhaled through a cone of paper. Used in this way most of the powders sold as remedies for asthma, such for example Senier's, Clery's, and Himrod's powders may be very advantageously employed, and I have had favourable experience with all the above-named powders.

Lately I have employed a small tin cylinder which is placed over a perforated receptacle for the powder, and then the powder being ignited, a moderate draught is kept up by a hand-ball of india-rubber. By this arrangement a steady current of medicated fume is blown through the cylinder, and complete combustion of the powder is ensured, so that a small quantity of powder

used thus will go as far as double the quantity burnt on the plate.*

I have already made mention of some of the more ordinary internal remedies to be had recourse to with a view to stopping an impending fit of asthma; such, for instance, as strong coffee, hot spirits and water, alkaline draughts, and so forth. I now come to say a few words on such medicines as may be employed during the actual fit for the sake of relieving the patient. Anti-spasmodics are the only medicines that appear to me worth swallowing for any relief that may be obtained, and of these one of the best to use is the tincture of the datura tatula, after this formula :—

℞ Tinct. Daturæ Tatulæ, ♏ x.—xx. ;
Sodæ bicarb., gr. x.—xx. ;
Spir. chlorof., ♏ xv., vel. spir. ætheris, ♏ xxx.—lx.
Aq. camphoræ, f. ℥j. M. Ft. Hst.

This draught may be taken every one, two, three, or four hours, according to the urgency of the symptoms.

Tincture of stramonium may be substituted for the tincture of the tatula, but is not so efficacious, being more narcotic and less anti-spasmo-

* See also description of Mr. Barker's instrument in chapter on Hay Asthma.

dic than the datura tatula. Belladonna I find valuable as a useful anti-spasmodic in asthma, especially given at night in a full dose. Like stramonium, belladonna appears to quicken the respiration ; sometimes belladonna appears to surpass stramonium as a reliever of the spasmodic form of asthma.

In very troublesome dyspnœa, due to old-standing cardiac disease, with lividity of the face and congested surface generally, I have found the tincture of belladonna, in doses of seven drops three times a day, give an amount of relief, and reduce the congested look of the face and surface in a very decided and satisfactory way, surpassing entirely the very numerous list of remedies that had been tried previously.

I recommend belladonna in cases of dyspnœa with much congestion, where opium is little else than a veritable poison to the patient.

Experimental enquiry tends to prove that belladonna stimulates the respiratory centre, as well as the sympathetic system, while it depresses the activity of the vagus nerve. Belladonna quickens respiration and circulation, and hence it is of use in congestive asthma. Opium appears to depress the function of the sympathetic system.

The dose of belladonna should be small at first, say five drops of the tincture; but if this does not seem to affect the patient soon, the dose should be quickly increased, and it is often not till we are giving six to ten drops in the dose that we get curative effects. If the belladonna be given in pill, a very good combination is made thus:

℞ Ext. belladonnæ, gr. $\frac{1}{4}$.;
Pulv. radicis belladonnæ, gr. $\frac{1}{4}$. Mix.

This pill may be given at bedtime.

The tincture of the seeds of stramonium (B. P.) is a good and efficient medicine, and may be given in doses of ten to twenty drops. The extract of the seeds is five times stronger than the extract made from the leaves, and the spirit extract of the B. P. may be given in a pill containing from a quarter of a grain upwards.

If the asthmatic be complaining much of flatus in the bowels, then if he can be persuaded to swallow a small teaspoonful of the sp. ammoniæ fœtidus in a wineglass of mint water, or brandy and water, it will probably be for his relief and comfort.

Among other remedies may be named the tinctures of cannabis, of sumbul, and of henbane.

They are rarely preferable to the stramonium for medicinal efficacy, but at times one may be glad to use one or other for a change. The tincture of sumbul, in doses of fifteen to twenty drops, is an elegant, pleasant medicine, and certainly possesses decided anti-spasmodic properties; like the other tinctures, it will go well with ether or spirit of chloroform. The hydrate of chloral in doses of fifteen grains and more sometimes relieves asthma in a wonderfal way, but like many other remedies it cannot always be depended on.

Chloral in full dose makes respiration slow and full, and it appears to do this by acting on the respiratory centre at base of brain, for Rajewsky observed this action of chloral on the respiration after the vagi nerves had been divided. Consideration of these statements would lead us to expect good from chloral in cases of asthma due to disturbance of respiratory nerve centre.

The croton chloral hydrate, so valuable in my experience in neuralgia of the fifth nerve, does not disturb the brain so much as the ordinary chloral, and may be tried in asthma. At present I have not any experience, however, of its use to offer to the reader.

Among very convenient internal medicines I

may here mention Clertan's "perles," made by M. Jozeau, of the Haymarket, and those made also by M. Tisy, of Paris, and kept in London by Messrs. Corbyn.

These perles are thin gelatine capsules containing a few drops of ether, chloroform, phosphorated oil, or any other liquid medicine. They can be carried about easily, and one or two of the ether perles swallowed will often quickly relieve an attack of commencing spasm and dyspnœa.

Before quitting the subject of the immediate treatment of the paroxysm of asthma, a word may be said on the use of subcutaneous injections as a means of affording relief. The effect of the subcutaneous injection of morphia was tried some years ago, with marked success, by Hirtz, in the case of a girl who had severe attacks of asthma, the respiration being so noisy as to be audible outside the room.

One-hundredth of a gramme of acetate of morphia injected under the skin of the arm gave the greatest relief in five minutes.

For rapidity, but not for safety of action, however, the sulphate of atropine, in doses of one five-hundredth of a gramme, was found superior to the morphia.

It is suggested by some to combine the two remedies, and Dr. Cleland of America finds one-eighth of a grain of morphia and one-hundredth of atropia a very effective injection.

At present, the best way to employ the acetate of morphia hypodermically is in the form of the *Injectio Morphiæ Hypodermica* of the B. P. One to six minims may be injected, the larger dose representing half a grain of acetate of morphia.

I would venture to hope that some useful hints may be gathered from this chapter as to the means to be employed for the relief of the asthmatic when in the actual fit. The next chapter is on the management of the asthmatic, with a view to a permanent cure.

CHAPTER VI.

Management of the asthmatic patient in the intervals of his attacks —Nerve-tonic medicines of use—Caprice of asthma with respect to atmospheric causes prevents our laying down any absolute directions as to climate—As a rule, the air of towns, most generally agreeable, cause of this—Of exercise by riding, walking, and swimming—Diet—Medicinal treatment—Tonics often of service—Cases illustrating effects of treatment.

WHEN a patient has recovered from a bad fit of asthma, he naturally inquires, "What can I do to prevent these dreadful attacks?" In answer, we may assure him that he can do a very great deal to avert the fits if he will but exercise some resolution, and not rest content that he is doing all that can be done in swallowing two tablespoonfuls of physic three times a day, and taking pills every night.

That certain medicines of the nerve-tonic class —such as zinc, quinine, arsenic, phosphorus, and salts of iron and silver—do act unmistakeably as curative agents for asthma, I have proved in

a goodly number of cases; but such is the notorious caprice of asthma, that we often fail, even after trying remedies that experience leads us to think promise well, thoroughly to cure the complaint by our medicines; hence, it becomes of great importance to point out to the patient certain rules of living, which, faithfully carried out will add much to his chance of cure.

With respect, first of all, to the climate adapted for the residence of a person liable to spasmodic asthma. This is so entirely and peculiarly a matter of individual experience, that it is vain to attempt to lay down any universal and absolute law upon the subject. General experience would, I expect, make out the city of London to be the spot most agreeable to the majority of asthmatics.

I believe it is the carbonaceous matter of the London air that renders it so salutary and antispasmodic; for the more sooty the air, the better does the asthmatic seem to be. Absence of ozone in the air of cities may render it sedative to very irritable lungs in certain cases.

Dust is especially obnoxious to asthmatic persons; some kinds being far worse than others. Thus, the dust of hay or corn is a powerful

exciter of asthma; so too, is the dust of linseed-meal or of ipecacuanha, the pollen of certain flowers, and the dust raised by shaking a bed or brushing a carpet.

A sudden fall of temperature is a potent cause of asthma; so, when cold sets in, the asthmatic must protect his chest by warm clothing, and his respiratory organs by a comforter, or silk handkerchief; this last forming an excellent respirator.

A fall in the barometer is usually attended with great discomfort to those who are the subjects of bronchitic asthma with much secretion. In consequence of the diminished atmospheric pressure, the superficial vessels of the skin and mucous surfaces become gorged, and secretion is readily effected; but, owing to the air being already charged with humidity, evaporation does not take place; hence the oppressed condition of the patient.

Sea air is particularly bad for some, while others, especially those subject to hay asthma, or summer catarrh, are much relieved by it; moisture in the air, soothing to some, is very oppressive to others. The rooms inhabited by the asthmatic should be lofty and airy, and

warmed by an open fire rather than by a stove or hot-water pipes. Candles are better than gas as a means of lighting the apartment. The bedroom must be kept well aired, and the asthmatic must take care that his mattress and pillow are not stuffed with anything that may prove a cause of his fit assailing him as soon as his bed gets warm. Sometimes a feather bed will prove an efficient maintainer of a tendency to nocturnal asthma. Daily exercise in the open air should not be neglected; and several cases testify to the effect of a steady walk in preventing an attack of asthma even when it already threatens. Horse exercise is especially beneficial; it promotes regular movement of the diaphragm, and is one of the best forms of exercise the asthmatic can indulge in. When the patient is free from any trace of bronchitis, swimming is an exercise that appears to me remarkably beneficial; it promotes full inspiration by the lungs in a most satisfactory way.

The dietetic management of asthma is a point on which universal experience teaches that much stress should be laid; and here it is that the patient must exercise some amount of resolution and self-denial.

In the first place, he must avoid any special articles of food that prove indigestible and provocative of asthma to his individual constitution and he must further beware of over-loading the stomach. A distended stomach acts mechanically, by its pressure upwards against that very important respiratory muscle the diaphragm, to embarass the free action of the heart and lungs, besides being also a source of reflex irritation to the pneumogastric nerve. If, however, the overloaded stomach does not happen thus to become an immediate exciter of the asthmatic fit, the probability is that the acidity and flatulence likely to be generated in the imperfect digestion of a large mass of aliment will most certainly bring on before long an attack of asthma likely to prove severe and persistent.

The digestive powers of asthmatic patients are, as a rule, weak; hence they must never be overtaxed, and it is a point of some moment to see that the asthmatic is not allowed to take much food when under the immediate influence of any excess of fatigue. He must rest quietly, and then begin to take food slowly and sparingly, using for drink either weak brandy and water or else dry Manzanilla sherry. In the general

mode of living, it is best for asthmatic persons to make their chief meal in the middle of the day, from one to three o'clock, and to try and take little or nothing after this unless it be some bread and milk, or a cup of cocoa or tea with plenty of milk in it, not later than six o'clock.

The dinner should consist of some wholesome meat, as mutton, beef, or fowl; boiled fish, too, may be allowed, and so may a light pudding. Cheese, pie, and pudding-crusts are notoriously bad, and must be carefully avoided, as should also dessert.

But little drink should be taken with dinner; but two or three hours after the meal some toast and water, or, if the action of the heart be very feeble, pale brandy and water may be allowed.

Malt liquors of all kinds are bad, and should be avoided.

Dining thus early in the day ensures the completion of the digestive process before the patient goes to bed, and very greatly diminishes the severity of nocturnal asthma, if it does not entirely prevent the attack coming on.

In the morning, it is to be hoped the patient will have a fair appetite, and breakfast is the meal when this may be indulged with least risk of mischief. Cocoa or tea, with eggs, mutton chops

cold meat, or game, are allowable on the breakfast-table of the asthmatic. Coffee is best kept in reserve for use when the fit is on.

By this practice of taking a good breakfast and an early dinner of wholesome food, with little or nothing during the after part of the day, it is surprising with what comfort an asthmatic can get through his nights. To submit to this strict regimen always requires some determination, and many persons, especially those who have free expectoration with their asthma, have the very erroneous belief that anything short of three good meals of meat in a day is a dietary quite insufficient to enable them to bear up against the presumed weakness and exhaustion which must, as they suppose, accrue on protracted attacks of asthma and expectoration. I never yet knew or heard of one patient of this class who was not made in every respect worse by this bad practice of high feeding, with the liberal alcoholic stimulation which is sure to go along with it. The reason of this is, that owing to the high feeding much blood is made, and this stagnates and congests in the pulmonary capillaries, which can only relieve themselves by secretion of mucus, and copious expectoration.

This plan of high living keeps up also a condition of congested liver and abdominal plethora that greatly interferes with the action of the lungs and heart. An Indian gentleman told me some years ago that he knew his liver was becoming congested by the difficulty he felt in performing on his favourite cornet. I have also known a glass of spirits and water to bring on very speedily great oppression in the breathing from producing congestive swelling of the liver and impeded descent of the diaphragm.

To see what good results can be obtained by a severely strict plan of diet and regimen, any one need only peruse the cases published by Mr. Pridham, of Bideford. One case, first published in the *British Medical Journal* for 1860, is a most impressive one. A Clergyman, 70 years of age, had been asthmatic for ten years. He was not able to lie down in bed, and for years every night he had anticipated death before morning; when, however, a copious, heavy expectoration had been thrown off the lungs, he was relieved, and was able to get up and move about in much discomfort.

His diet was as follows:—At six in the morning, a cup of coffee; at nine, he had tea or coffee,

toast, eggs, or a chop; lunch at one, on bread cheese, and porter; afterwards a good substantial dinner, followed by both tea and supper!

This patient, despite his rather forcible remonstrances, was persuaded to take off three-quarters of the total amount of food taken in the twenty-four hours. The result was, that at the end of a week he could lie down and sleep; and, while his expectoration decreased, his appetite improved. This improvement continued, and in due time he became able to sleep during the whole night with comfort, and resume his clerical duties, which had been for ten years suspended.

This is a well-marked and interesting case for the encouragement of the asthmatic to persevere in habits of self-denial and care in eating and drinking.

In the *Medical Times and Gazette* for Feb. 1870 is an account of the Abbot of La Trappe, who was a bad asthmatic till he was submitted to the extremely rigid diet of the convent, involving abstinence from meat, and then he quite lost his asthma.

The system of diet which Mr. Pridham recommends for a confirmed asthmatic is as follows: it is certainly a rigid one, but of its curative proper-

ties, in many inveterate cases of asthma, there is good evidence.

Breakfast, at eight a.m., to consist of half a pint of tea or coffee, with cream, and two ounces of stale bread.

Dinner at one.—Two ounces of beef or mutton, and two ounces of dry stale bread or boiled rice. Three hours after dinner, half a pint of brandy and water (weak), or sherry and water; or else toast and water *ad libitum.*

Supper at seven.—Two ounces of meat and two ounces of bread.

As a general rule, I prefer to allow the patient a moderate dinner at two or three o'clock, and then to dispense with supper entirely, though a small quantity of toast, or bread with butter may be taken at tea-time.

Many patients will be content, and do very comfortably on this restricted system of diet, but others are met with, true asthmatics, to whom rather more licence must be given, or they will get into a weak and highly nervous state very adverse to throwing off the asthmatic tendency.

To these cases we must allow a larger number of meals, taking care that they never at any one time

have more than from six to eight ounces of food, and as a rule the food should be of a fleshy or nitrogenous character rather than farinaceous or saccharine. Examination of the urine, as to excess of urea, and presence of oxalates or lithates, is a very good guide as to the kind of diet most suitable in a given case.

In some of these cases, where debility is an obvious symptom, I do not hesitate to advise a cup of milk, with brandy, during the night, as a means of preventing great exhaustion.

Beef tea, with pepsine, or lactopeptine powder, or pepsine wine, is also a capital food in the daytime in these cases.

When the patient recovers his strength, and the volume of blood circulating in the body and the lungs increases, then it will be requisite to cut down the diet a little, or there will certainly be premonitions of the return of the attacks of breath-difficulty. The quantity and quality of the blood, as well as of the air, going through the lungs of the asthmatic, require to be adjusted to a nicety; disturbance in the balance of these two circulations is sure to cause difficult breathing.

When we have managed the important but often difficult matter of getting the asthmatic patient

to abide by a regular system of diet, and when a short experience has proved to the patient that he is *not being lowered*, but, on the other hand *manifestly invigorated*, both in body and mind, by what may at first appear to one who has been a high feeder rather scanty fare, then is the time to endeavour by medicines to overcome the asthmatic tendency in the constitution.

The medicines that appear to me most generally useful in overcoming the tendency to asthma are of the tonic and nervine class; thus, iron, quinine, mineral acids, silver, zinc, arsenic, with many others, possess good claim to our notice.

To give a tonic during the day, and an anti-spasmodic at night, I often find a successful practice, as the following case shows :—

CASE I.—Sarah H——, æt. 22, living at Limehouse, came to the Victoria Park Hospital in the summer, in consequence of attacks of asthma. Her mother died of this disease, and she has two brothers, between 20 and 30, who are great sufferers, and in whom the asthmatic physique is already developed, though this is not the case with the patient, who is well made, and of healthy, rather florid aspect.

She has been ill two years, and is worst in damp weather, always has some amount of dyspnœa, but the worst attacks come on when in bed.

There is no history of gout or rheumatism in the family, nor of any skin disease.

Chest, fully resonant; breathing, feeble. No râle or rhonchus. Tongue, moist. Pulse, 74. Bowels, not open.

This patient for the space of five weeks took no other medicine than a grain of Extract of Stramonium every night, and a mixture of

Ferri Sulph., gr. j.
Mag. Sulph., ℈j.
Aq. Menth. Pip., ℥j.

Three times daily. At the end of this time she declared herself to be free from difficulty in the breathing, and was discharged cured.

The tendency in this case clearly is to the production of an emphysematous state of lung; the constant sense of dyspnœa and hereditary predisposition pointed to this; and it is in these cases where iron preparations, especially when combined with a saline laxative to relieve congestion of abdominal viscera, are so very beneficial.

Asthma and emphysema of long standing; much relief from Carlsbad salt.

CASE II.—W. B., æt. 51, seen July, 1871. Family history, good, both parents having lived to a great age, and both free from gout. Patient has been troubled with fits of asthma during the last twenty-three years. No history of any inflammatory attack in the chest, no relief from stramonium, belladonna, or nux vomica; all of which

remedies appear to have been fully tried. The fit of asthma comes on in an ingravescent way at any time of day or night; it gradually gets worse, but when a glutinous expectoration is discharged, patient feels relieved. On examination patient has a distended chest, full abdomen, with slight enlargement of liver, heart sounds weak and muffled, with systolic apex murmur. Pulse 92, soft. Throat and tongue dusky-looking. Urine loaded with lithates. Extra resonance of chest, breath sounds feeble, expiration prolonged with wheezy râles.

I prescribed a small teaspoonful of Carlsbad Sprudel salt in warm water first thing in the morning three times a week, and the use of one of Joy's cigarettes whenever the asthma seemed impending.

I cannot say the patient is well, as I see him occasionally, but he has repeatedly assured me that he never got such relief from his asthma before as he obtained when he had for some few weeks persevered with the Carlsbad salt.

Both of these cases show the great importance of attending to the abdominal organs of asthmatic people, and I have repeatedly obtained much credit by the use of a prescription of sulphate of magnesia with tincture of calumba and mint water in cases where a variety of sedatives, inhalations, expectorants, and tonics, had been administered during periods extending sometimes over months, and not uncommonly over many years.

Habitual dyspnœa, cough, and irritation of throat, are symptoms often complained of much by this class of patients, and we find them usually carrying about various lozenges for the relief of the throat troubles.

Care as to diet and a mild alkaline laxative to relieve abdominal plethora soon enable them to throw away all their lozenges. A small tumblerful of the Ems water at bedtime I find very beneficial in cases of mucous catarrh of the throat and fauces, and preferable to astringent lozenges, which so often impede digestion and constipate the bowels.

Asthma due to bronchitis; spasm a feature in the case, long course of treatment, and at last complete cure by oxide of silver.

CASE III.—Isaac P., æt. 24, a pale dark youth, has been some time under treatment for cough and difficult breathing, the result of a severe cold caught six months ago.

Seen by me August 5th, 1867. He has just come back from Hastings, and while there had very little cough and very little asthma, but since his return to the vicinity of London his cough has returned, and at night he has sudden and bad attacks of difficulty in the breathing.

The chest resonance is good, breathing feeble, skin cool, pulse quiet.

℞ Ext. Stramonii. gr. j. om. nocte.
And mixture of phosphoric acid. ether, and mint water, three times daily.

August 12th.—Much relieved; rests well.

August 19th.—Worse, breath very bad; add to mixture, tr. lobel. ether, ♏ xv.

I did not see him again until September 23rd, when he came to me quite as bad as he was when first seen; he says the stramonium pill has lost all its effect; and at night he starts up with sudden attacks of dyspnœa, pallor of face, abdomen strongly drawn in at epigastrium. The pulse is weak, but no cardiac disease to be detected.

From October 7th till 21st he took, twice daily, a pill containing gr. ¼th of oxide of silver, and a mixture with some dilute nitric acid, and this treatment told at once on his asthma, so that at the end of October he seemed to be perfectly cured.

This was a complex case. The origin of the asthma was bronchitis; the mild air of Hastings gave relief, but it was a nervine tonic medicine that acted quite as a specific; and I ought to say that I never before saw such marked effect produced by oxide of silver, though I have given it in numerous cases with a certain amount of benefit. In 1787, Dr. Withers recommended oxide of zinc in dose of 5 grs. three times a day for the cure of

asthma, and this oxide appears of value in some cases, but to me its action has not seemed so well marked as that of the silver oxide.

Spasmodic asthma after bronchitis, relieved by oxide of silver, cured by arsenic.

CASE IV.—Charles W., æt. 36, has been liable to asthma for two years since he got wet. The attacks come on very early in the morning, and pass off with cough and expectoration of clear mucus. Chest resonant, heart sounds feeble generally.

℞ Argenti Oxidi, gr. j.;
Ext. Lupuli, gr. ij.

This pill was taken at bed-time with speedy relief. One night he omitted the pill, and the attack at 3 a.m. was as bad as ever.

He kept well for some time, but, after taking cold, the asthma returned, and the pills failed to relieve; a change was therefore made to the liquor arsenicalis, three drops three times a day in infus. calumbæ. Under this medicine he got quite well.

Arsenious acid and the liquor arsenicalis (Fowler's Solution), which is arsenious acid dissolved by carbonate of potash, are both valuable remedies in the cure of spasmodic asthma.

The arsenious acid may be given in a granule or pill made with manna, in a dose of 1-50th to

1-20th of a grain with perfect safety, and the liquor arsenicalis may be given in a dose of ♏ iij. to ♏ viij., the larger dose representing gr. 1-16th of arsenious acid.

The liquor sodæ arseniatis, which contains a definite arseniate of soda in the proportion of four grains to the ounce, is also a good preparation, and may agree better with the stomach than the arsenious acid preparations.

The following cases illustrate the effect of arsenic as a remedy for asthma:—

Spasmodic asthma of ten years' standing—Great relief from Fowler's solution.

CASE V.—*October 25th,* 1866—Edward G—— æt. 33, came to the hospital. Been liable to asthma for ten years; from age of twelve had a cough and shortness of breath. At times is free for some weeks of all breath difficulty. Face cheerful, pale, no congested look. Heart and lungs good. Not worse in damp weather, always breathes best when in London; lives at Bethnal Green.

The attacks come on about four a.m. with sense of tightness across the chest, and go off with cough and mucous expectoration.

Never any hæmoptysis, gout, rheumatism, or skin disease.

℞ Hst. Ferri et quassiæ c. mag. sulph., ℈j. t. d. s.
Pil. conii co., o. n. s.

November 1st.—"In statu quo" in all respects. Pt. omnia.

November 8th.—Worse. Had a bad attack.

℞ Liq. Fowleri, ℥iij., ex inf. calumbæ, t. d. s.
Pt. Pil.

Once or twice feared an attack was coming for the first week, but persevered with the medicine, and on November 29th felt well enough to be discharged, greatly relieved. In this case the intervals of perfect freedom from breath difficulties should be noticed as a favourable element.

In uncomplicated asthma of children the Fowler's Solution is often very serviceable. I select one from among many instances in proof:

Spasmodic asthma in a boy cured by liquor arsenicalis.

Case VI.—Henry W., æt. 10 years, a fair lad, was sent to me at Victoria Park Hospital by Dr. Borlase Hicks.

The boy has bad attacks of nocturnal asthma, obliging him to sit up at night; he is worse in hot weather, but gets relief when at the sea-side. He has a good deal of cough; wheezy sounds with very prolonged expiration are audible over his chest. Tongue clean and moist.

He once had eczema of the scalp, and as this eruption got well the asthma developed itself.

Belladonna and bromide of ammonium gave no relief whatever, but during the month of July, when

his attacks were at the worst, I put him on small doses of the liquor arsenicalis with speedy and most decided relief to all his bad symptoms.

The presence of some amount of bronchitis and gastric disturbance need not prevent the curative action of the arsenical solution.

Severe attacks of asthma of long standing, with chronic bronchitis. Complete cure by Fowler's solution.

CASE VII.—In the following case the curative effects of Fowler's solution was both prompt and permanent.

On July 7th, 1864, at the end of a rather heavy afternoon's work at the hospital, a patient, looking the picture of misery from chronic chest troubles, came to me for advice.

Her age was about 50, and her complaint was of cough and much yellow expectoration, with extreme dyspnœa, debility, loss of appetite, and frequent vomiting of her meals.

The chest was tender but resonant, respiration very feeble. Tongue red-edged and furred in centre. This patient was ready with a long account of the advice she had had and the amount of physic she had taken, but, not having time left to hear all this, I advised her to take the following draught three times daily, with the pill at night, and come to me again in a week:—

℞ Hst. calumbæ c. Soda.
Liq. Fowleri, ℥ij., t. d. s.
Pil conii co., gr. v. om. nocte.

In a week's time the relief to all the symptoms was most remarkable; she continned the treatment till the hospital letter was out, and on May 27th, 1867, I saw her looking stout and healthy; and she said she had not needed any treatment since she left Victoria Park Hospital, in August, 1864.

Complicated asthma.—Symptoms aggravated by arsenical solution.—Relief by other remedies.

CASE VIII.—Mrs. Mary B——, æt. about 50, has been attending at Victoria Park Hospital for ten years, in consequeuce of great difficulty in the breathing, with dark expectoration, at times mixed with blood,

Stout, not unhealthy in aspect, has severe cardiac palpitation at night. No murmur heard.

Ordered on February 20th, 1866, to take—

Liquor Fowleri, ♏ij., ter die.

March 1st.—Much worse. The spitting of blood has been very troublesome. Omit the medicine, and take the following:—

Sodæ hypophos., gr. v.
Sodæ bicarb., gr. v.
Aq. menth. pip., ℥j., m. t. d. s.
Pil. zinci et hyoscyami, om nocte.

March 22nd.—The "jumping" of the heart is almost gone, the breath is better, and she rests better; continued well till November 5th, 1866, when, as the cold weather eame on she returned,

and when asked, stated that she had kept pretty well since her attendance in the spring.

I should not now prescribe arsenic where hæmoptysis and a feeble heart were present as prominent symptoms.

CHAPTER VII.

Medicinal treatment of asthma continued. — Value and safety of arsenical preparations. — Cases. — Mont Dore waters. — Phosphorus and hypophosphites. — Sulphur and its compounds. — Waters of Amélie and Cauterets. — Many cases of asthma must be treated on general principles with a view to allaying irritation of the pneumogastric nerves. — Illustrative cases.

IT is now sixteen years since I first became convinced of the value of arsenical preparations in the treatment of certain forms of asthma, and during that period I have never seen harm of any kind from the careful employment of this medicine. The remedy is not new, for A.D. 54 Dioscorides used the sulphuret of arsenic in the treatment of difficult breathing. Arsenic, like sulphur, may act by correcting some morbid diathesis in the blood. Arsenic also seems to me to possess some special power over the pneumogastric nerve. Recently I have had under my observation a mother and daughter, the first suffer-

ing severely with irritative dyspepsia and vomiting, the second with bad attacks of spasmodic asthma. In each case the relief obtained from the use of one drop of Fowler's solution three times a day was most decided, far surpassing that from all the numerous medicines previously tried. It seems here reasonable to suppose that in each case the pneumogastric nerve was in a state of irritation; in the daughter the irritation showed itself in the pulmonary branches of the nerve, in the mother in the gastric branches. The same medicine proved curative to both patients.

To explain the nature of undue irritability of the pneumogastric nerve seems impossible, but the fact continually comes before us in practice. One person gets violent dyspepsia, is in fact poisoned if he partakes of certain articles of food that to most others are harmless; a second individual gets a stoppage of his breath and spasm at the chest if he inhales the smell of hay, of linseed meal, or of ipecacuanha powder; substances the odour of which is without effect on most of mankind. In these cases the pneumogastric is poisoned at its pulmonary, rather than at its gastric extremities. The following cases further illustrate the curative action of arsenic.

Spasmodic bronchial asthma—much relief from arsenic and Gicquel's cigarettes.

CASE IX.—Mrs. E., aged 40, was laid up with bronchitis eighteen months before I saw her in September, 1875. The bronchitis got quite well, but, during the last two months this lady has had attacks of severe asthma every night, obliging her to sit up in bed and passing off with cough and expectoration.

During the day she is quite well, except when the air is clear and cold. Appetite good, respiratory sounds over chest feeble. Pulse 60. Throat healthy, tongue clean.

A course of iodide and bromide of potassium gave very slight relief. Subsequently she was ordered to take five drops of liquor sodæ arseniatis in infusion of gentian three times daily, to have the chest well rubbed every night with a stimulating liniment, and to inhale the fume of one of Gicquel's cigarettes whenever an attack of asthma was threatening. In answer to inquiry, in March, 1876, I was informed that since using these cigarettes, and the arseniate of soda medicine, she had been quite free from asthma. The Cigares Anti-asthmatiques de Gicquel (of Saint Malo) are well known in France; and, in cases of asthma with bronchitic tendency, they answer much better than nitre paper. Phthisical patients who suffer much with spasm in their breathing have told me that these "cigares" often afford them ease.

Spasmodic asthma relieved by arsenic, cured by tincture of quinine.

CASE X.—Miss D., aged 30, seen in December, 1875. No family history of asthma, general health always been good, but for last nine years has been very subject to attacks of spasmodic asthma at night. She has often to sit up for two hours, and finally gets relief by raising a scanty glutinous sputum.

Throat and larynx are healthy, chest resonance good, no sign of any lung disease, no marked dyspnœa on exertion. For some time this patient was under the care of the late Dr. Salter.

The immediate attacks are always greatly relieved by burning Senier's or Himrod's green powder on a plate.

The administration of four minims of Fowler's arsenical solution three times daily had a decidedly beneficial effect, but, as it was noted in this case that the attacks of asthma came on with great regularity at 5 a.m., it was decided to try a teaspoonful of the tincture of quinine three times a day in a wineglass of water. In three weeks this lady wrote to say she was quite well, nor have I heard of any relapse. The patient lived in London, and had never been the subject of anything like ague or intermittent fever.

The Mont Dore waters are said to owe their anti-asthmatical properties to the presence of arseniate of soda. Each litre (35 oz.) of the Madeleine water contains, along with carbonate of soda and

lime, ·00096 grm. of arseniate of soda. The Bourboule water has a proportion of ·007 to ·013 grms. of arseniate to the litre. That in asthma, and some affections of the throat and air passages, these waters are valuable is well proved, and numbers of invalids resort to Mont Dore every summer, often with great advantage. The power of small doses of arsenic to increase the strength of respiration is well illustrated in the case of the peasants of Styria; these co-called *ratsbane-eaters* being reported as very strong and healthy, while they often take one or two grains of white arsenic daily. It is indeed reported that far larger quantities than the above are taken, but recent inquiries appear to throw doubt on such assertions.* In the case of a young woman lately under my care in Victoria Park Hospital, who lost her severe asthmatic attacks entirely under treatment by arsenic, we noticed a decided gain of weight during the course of treatment.

Arsenious acid is soluble in the proportion of 1 in 100 of cold, and 1 in 20 of boiling water, and I have used such solutions in the spray atomiser, diluted so that about 1-26th of a grain in solution was used at one time. I cannot,

* Wood's "Therapeutics," page 315.

however, as yet report any extraordinary results from this practice.

From information, for which I am indebted to Captain J. Thomas, of Camborne, in Cornwall, it appears that men who are exposed to the fumes of arsenic works scarcely ever suffer from consumption; and, in the case of a superintendent who for years had suffered with weak chest and blood-spitting, habitual exposure to the fume of the arsenic flues resulted in a complete cure. The value of cigarettes containing arseniate of soda has been already alluded to.

It will be observed that in Case VIII. phosphorus, in the form of the hypophosphite of soda, did good after arsenic had failed.

The Hypophosphites of soda, potash, and lime are salts that I have long used with advantage in many forms of pulmonary disease. When properly prepared these salts are so rich in phosphorus that they burn when heated on a spatula in the flame of a lamp; they are very soluble salts, and rarely disagree with the stomach, though sometimes a good deal of flatulence is complained of shortly after taking a dose of the hypophosphite.

The hypophosphite salts are preferable to arsenic in cases of asthma, with tendency to bronchitic

complications and congestion of lung. The following case illustrates this :—

Asthmatic attacks at night, with intensely susceptible chest. Cure by the hypophosphite of lime.

CASE XI.—Ann G., living at Peckham, æt. 42, seen May 20th, 1867. She has been ill one month with severe cough and frothy expectoration; at night she is seized with attacks of asthma, with spasmodic pain across lower part of chest. She is much worse if it be at all wet, and one night, on its coming on to rain, she was at once woke up from her sleep and obliged to have the fire lighted before the breathing was at all relieved.

The chest is resonant, and bronchitic râles are audible on both sides.

℞ Calcis hypophosphit., gr. v. ;
Aq. menth, pip. ℥j., m. t. d. s.
Pil. conii., co. gr. v. om nocte.

Tincture of iodine applied to the chest.

In a fortnight the relief to the breathing was very decided; she began then to take quinine. In a week more the susceptibility of the chest was greatly diminished, and all signs of bronchitis had entirely vanished.

This is one, as an example, of a class of cases of very susceptible chest, associated with more or less true bronchitis; though the difficulty of breathing and asthma is out of all proportion to the amount of bronchitis present in the lungs.

The hypophosphites of soda, potash, and lime, may often be given with great advantage in these cases, and I believe these salts act, partly by their invigorating effect, on the nervous system.

At times phosphorus, gr. one-fortieth, with sufficient solid fat to make a small pill, or phosphorated oil in one of Tisy's capsules, will answer better than the hypophosphite salts in relieving the dyspnœa.

In the case of a lady, æt. 43 years, who, in consequence of a severe cold, had got chronic bronchitis of eighteen months' duration, with very bad attacks of nocturnal asthma, I tried stramonium, arsenic, mercury, and iodide of potassium without in any way relieving the dyspnœa; and after between two and three months of treatment to very little purpose, I tried the phosphorus pill, gr. one-fortieth, three times daily. After a short time the relief obtained was decided, and for a while, indeed, I thought the patient was cured, but I hear that recently, while away from town, she has had rather a bad relapse.

Sulphur is another medicine valuable in the treatment of spasmodic asthma. It was suggested years ago, by Duclos of France, that asthma was a manifestation in the air tubes of a herpetic diathesis, the varieties of asthma corresponding with various forms of skin disease. On this hypo-

thesis Duclos placed much reliance on arsenic and sulphur as remedies for asthma.

That asthma, in its spasmodic form, often alternates with some chronic skin disease is a point that can be proved by numerous instances. One I call to mind of a little girl who had well-marked spasmodic asthma following on the cure of psoriasis of the skin by the late Mr. Startin.

Sulphur is best employed in the form of some of the sulphur waters found at Harrogate, in Yorkshire, and at Amélie les Bains, in the south-west of France. These waters must be employed only when inflammatory action is quiet, and the warm and mild climate of Amélie will tend greatly to check any bronchitic irritation of the chest, and so prepare the way for the use of the waters.

The hot sulphur springs of Amélie, used in vapour bath and by inhalation, have proved eminently curative in cases of asthma due to sudden suppression of habitual perspiration of the feet.

Another thermal sulphur station of the Pyrenees is found at Cauterets; the sulphur existing in the form of the sulphide of sodium, together with chloride of sodium, silica, and organic matter.

The water of the Raillère spring, at a short distance from Cauterets, enjoys an increasing

reputation for the cure of chronic laryngitis and pharyngitis, and especially is this water praised for cases of humid asthma.

If there be any tendency to blood-spitting, the cool and bracing air of Cauterets is preferable to the milder and more sedative climates of Amélie and Eaux Bonnes.

The sulphur waters of Marlioz, near Aix, in Savoy, used by inhalation, have done great things for a patient of mine long subject to catarrhal asthma. It is in bronchorrhœa and humid asthma that we may, according to Dr. Macé of Marlioz, expect benefit from the use of these sulphur waters.

I have observed some inveterate cases of asthma to be associated with chronic pharyngitis and laryngitis, the follicles of the tonsils and pharynx being swelled and irritable; often I believe this affection is a true tonsillar herpes, and in these cases sulphur is one of the best medicines that can be employed.

When circumstances prevent the patient from resorting to any of the sulphur springs, we may try the effect of administering the sulphur in powder, or as the confection of sulphur of the B.P. Well-washed sublimed sulphur is generally prefer-

able to the precipitated sulphur, and it may be given in doses of from five to ten grains night and morning, with an equal quantity of heavy carbonate of magnesia mixed in milk.

The oleum sulphuratum, or balsam of sulphur of the Ph. Lond., 1824, is made by dissolving one part of sublimed sulphur in eight parts of olive oil, and is a brown viscid substance with a most unpleasant smell; the dose is forty to fifty drops, and it has proved a good remedy to my knowledge in some forms of asthma.

Another preparation of sulphur that I have found serviceable is the sulphurated potash of the B.P. This salt may be given in the form of tincture, or as a pill, containing one or two grains to the dose. Like the balsam of sulphur, the pills have a disgusting smell, but this may be obviated by making them up with some powdered cinnamon and a drop or two of the oil of anise; this last very completely overcomes the odour of the sulphur in the pill.

While the action of preparations of sulphur, phosphorus, and arsenic in cases of asthma is often strikingly curative, yet there are cases where these medicines fail, though the case may be one of uncomplicated asthma.

This class of cases must be dealt with on general principles, the object of treatment being to allay irritation of the nervous system and to invigorate the same by means of nerve tonics.

Where the tendency to asthma is due to rheumatism, the patient being invariably worse in damp weather, the iodide of potassium or ammonium combined with the carbonate of ammonia may be given with confidence. Camphor water or plain water is generally the best vehicle for the administration of these salts, but I have given them sometimes in the infusion of senega, and certainly have found the combination efficacious, though very unpleasant to the taste.

Occasionally the bromide of ammonium succeeds better than the iodide; either salt may be given in a commencing dose of five grains.

Among other medicines at times useful in asthma are: zinc in the form of the oxide and sulphate; silver as nitrate and oxide; and the carbonate and sub-nitrate of bismuth. To lay down precise rules for the administration of these drugs is not easy. Nervous irritability of the system and want of sleep at night would lead one to select zinc; and I usually give the oxide in a pill, with ext. hyoscyami—of each, two grains.

The opportunity for using the oxide of silver in dose of a half to one grain appears when there is tendency to gastric irritation, and to very sudden invasion of the asthmatic attack.

The action of bismuth, I believe, is confined to the stomach; and in cases where an empty and irritable stomach appears the cause of asthmatic attacks, the subnitrate of bismuth may be given in a dose of five to fifteen grains half an hour before a meal.

The mineral acids, and especially the phosphoric acid, are useful in the general treatment of asthma, and so are such tonics as quinine, strychnine, and nux vomica. In those cases where prolongation of the expiration is a marked symptom, the tincture of nux vomica in doses of three to ten drops, or the liquor strychniæ, in doses of three to five drops, will be found admirable medicines, and may very advantageously, in many cases, be combined with some of the preparations of iron.

The two following cases illustrate what has been said:—

A Case of Asthma, with rheumatoid affection, cured by iodide of potassium.

CASE XII.—William P——, an elderly man,

has long suffered with what he calls rheumatic gout affecting the smaller joints, and, in May, 1865, he came under my care at Victoria Park Hospital for attacks of dyspnœa of extreme severity, together with a cough, attended with expectoration, sometimes clear and frothy, at other times yellow and thick. No signs of structural change to be detected in the heart or lungs.

The treatment here was very simple, and yet remarkably successful.

It appears that he got a mixture of—

Potass nitrat.,
Pot. iodid., āā, gr. v.
Aq. menth. pip., ℥j., t. d. s;

and this after a fortnight was followed by a chalybeate tonic.

In six weeks the man was discharged cured, and a month or two after wrote a note spontaneously, to express his satisfaction at the immunity from asthma, as well as from any fresh gouty attacks, which he now enjoyed. No expectorants were used in this case, the treatment being mainly directed at the diathetic state.

Some time ago I had under my care, at the West London Hospital, a man who had most severe attacks of nocturnal asthma; his general health was good, he had not much cough, but the asthmatic configuration of chest was marked with some slight evidence of a rheumatic diathesis. I prescribed for him stramonium, ipecacuanha, conium, and one or two other medicines without the least benefit.

One day in my absence, the house surgeon,

Mr. Hill, ordered this man a mixture with iodide of potassium; and he told me he never had anything before that gave him such relief; he took the mixture for some time and was discharged greatly relieved.

The following case illustrates beneficial treatment from relieving gastric disturbance and flatulence by charcoal.

Very obstinate Asthma.—Failure of several remedies—Eventually much good from the use of acacia charcoal.

CASE XIII.—This was the case of Mr. O——, who, in consequence of severe asthma of two years' standing, came from Wales to London for advice. Before coming under my hands, he had already been treated by two eminent London practitioners without deriving benefit.

He was about 50 years of age, and after his meals and very often at night he was attacked by fits of asthma, that held him fixed as in a vice; his face became almost livid with congestion, and the sweat poured off him. Very hot brandy and water and tobacco-smoke, after a while, relieved him, and the asthma passed away with cough and expectoration.

No organic disease of heart or of lungs could be detected.

To detail all the treatment that this patient underwent would be a very long affair; while in the country he was salivated with decidedly evil

effect, and after he came under my notice in London, I tried an immense variety of medicines—such as arsenic, nitrate of silver, iodide of potassium, ipecacuanha, &c.—without any benefit whatever.

Eventually good came from the use of pills of ext. nux vomica and the ferrum redactum, but that which really did obtain some easy and undisturbed nights for the patient, seemed to be the use, two hours after meals, of powders of the acacia charcoal; from these he got much relief, but I cannot say that to my knowledge he was quite cured.

Hereditary Asthma in a brother and sister.—Co-existence of skin affection.—Partial relief from treatment.

CASE XIV.—The following case, already casually alluded to, illustrates well the supervention of bad hereditary asthma.

Henry B——, a clerk, æt. 16, living in Essex, came for advice to Victoria Park Hospital, September 21st, 1865. He is a healthy-looking youth, and he complains of severe attacks of spasmodic asthma. States that his father had asthma for thirty-six years, and he has a sister a few years older than himself who has been asthmatical for six years. Mother is free from all sign of the complaint.

Patient first began to be affected with asthma when 13 years of age; the attacks usually come on

about seven in the evening; he has them also in the night.

For an hour before the attack there is much tightness about the chest, and a feeling as if the chest would burst. He has fits of violent shaking cough, but never much expectoration.

He is always much worse in close, thundery weather; he cannot at such times remain in bed with comfort.

Tongue is clean and appetite good, but he never touches butcher's meat, as he cannot swallow it; eats much bacon. The throat, when examined, looks healthy, except that the palatine arch on the left side seems more ample than that on the right.

The action of the heart is feeble but regular. Note is made of prolonged expiration on both sides.

This patient received a mixture containing some of the tr. nux vomica, with dilute phosphoric acid; and, while taking it, he thought there was less of the constrictive pain about the chest.

In October, as he drew attention to a pustular eruption about face and neck, he was ordered some of the liquor arsenicalis; and after fourteen days this was changed to a mixture containing three grains of hypophosphite of potash three times in the day, and pil. conii. co., five grains every night. Under this last medicine he improved, so that he had but two attacks of asthma during the week. At the same time the cutaneous irritation subsided, and he was greatly relieved.

He remained in comfort till some wet weather

set in, early in November, then his asthma came on as bad as ever again, and he had six or eight bad attacks in a week. During these seizures the distension of the chest was so great as almost to burst his clothes open. The chest in the intervals was extra-resonant, its expansion free, expiration very prolonged, and no râle or rhonchal sound could then be heard anywhere,

A pill of extr. stramonium, gr. $\frac{1}{2}$, was now given every night, and he was advised to inhale one or two of the cigarettes de Joy every day.

In February, 1866, this patient suffered severely, his asthma taking him at all times, obliging him to hurry out of church and get to a warm room, where his breath seemed easier. At this time a pill of the ext. belladonna was tried at night, but from it no sort of relief was obtained; indeed, he thought he was worse on the nights when he took this pill.

An important feature in this case was a great tendency to constipation of the bowels, and an appetite that at times was voracious for such things as he could eat: and he seemed to prefer the asthma to the strict dietary that I constantly urged upon him. I was the more anxious as to the diet from observing that the worst attacks usually occurred on Sunday, when he was at home in the country, and took a good dinner of bacon.

This young man's sister had dry asthma, with well-marked psoriasis of the skin, and in her case the liquor arenicalis was of great service. Were the first patient in a condition of life to do such a thing, I should urge, as his best hope of cure, a visit to the climate and water of Amélie les Bains.

CHAPTER VIII.

Effects of inveterate asthma on the lungs, heart, and system generally.—Asthma complicated with organic disease of the lungs.—Its signs and symptoms.—Production of emphysema in asthma. Paralytic conditions of the lungs with difficult expiration, may be quite distinct from emphysematous asthma.—Treatment.—Expectorants useless.—Nux Vomica.—Quinine.—Iron of great service.—Inhalations.—Condensed air.—Use of galvanism.—Climate.—Regimen.

SPASMODIC asthma, though in the first instance, as we have shown in the preceding pages, a purely nervous affection, will, if unrelieved, produce sooner or later actual disease and structural change, not only in the lungs, but also in the heart, and thus very serious and often incurable evils accumulate upon the unfortunate patient.

It is, as has been already stated, when asthma begins to manifest itself on those who are somewhat advanced in life that these effects are most

certainly and most rapidly developed; hence when a patient over forty years old begins to be troubled with asthma, with or without catarrh, it is of the greatest consequence that all proper means should be taken to cure the complaint as fast as possible, or it will probably soon cause dilatation of the heart; and congestions of the lungs, liver, and brain, will appear as very serious features in the aspect of the case.

Where the asthma begins its attacks during youth the system becomes much more tolerant of the strain and perturbation to which it is subjected, and it is a common thing to find aged asthmatics who have been harassed by the complaint quite from an early age, and who, with the exception of some chronic bronchitis and emphysema of the lung, seem but little damaged.

In the case of a gentleman sixty years old, whom I saw for Dr. Salter in 1869, asthma had become developed during youth, and was now, after thirty years, complicated with bronchitis and emphysema of the lung. Advice in this case was sought on account of the severe asthmatic paroxysms, and when free from these the patient's life was one likely to last for many years.

A few years ago I had under my care a man,

aged twenty-seven, liable to most severe asthmatic fits, whose history runs briefly as follows :—

There is no hereditary tendency in the family to asthma, gout, or skin disease, and the patient had good health till he was twenty years old; he then noticed that after a fit of laughing he could not get his breath; asthmatic spasm with contracted lung coming on as a result of violent expiratory effort; and these fits by degrees became common at night, or rather towards early dawn. At first he had no cough, but in the course of a year or two a violent cough with frothy expectoration was added to his other troubles, and thus the case became one of complicated bronchitic asthma.

Examining this patient's chest during one of his worst paroxysms, I counted his respirations as many as sixty in the minute; expiration was prolonged all over chest, and with the imperfect short inspiration one heard a faint sound of liquid râle, which a full inspiration would have brought out in much abundance.

The use of Slade's cigarettes and a mixture of conium with ipecacuanha was of considerable service in this case. In the immediate paroxysms chloroform inhalation gave relief, and proved superior to nitrite of amyl, which I also tried.

Atmospheric conditions have much influence in causing spasmodic asthma to become complicated with bronchitis. The gentleman whom I saw for Dr. Salter had always lived in a very damp locality, and the last patient was a man whose dwelling was by the river at Poplar.

The supervention of fits of asthma in a youth, in whose family gout is hereditary, at a time of life when it was usual for this last-named disease to make its first appearance, gives every prospect of a very troublesome though not dangerous form of asthma; and if, when the asthma is fairly set in, the patient rather rapidly should increase in bulk and become stout, another sign is shown of the tendency of the asthma to settle and be confirmed in the system.

We may feel convinced that the pulmonary organs are beginning to suffer damage from protracted asthma when we observe that there is no longer complete freedom from all breath difficulty in the intervals between the fits of severe dyspnœa. The patient is always more or less short breathed, but especially bad in the morning when he rises and begins to move about, and cough and persistent expectoration become more and more annoying. The originally dry asthma will thus

become quite of the moist or humoral character, the susceptibility of the chest to cold increases, and the expectoration after a while becomes sometimes frothy, sometimes purulent, under the influence of attacks of bronchitic inflammation.

Gradually the lung tissue loses its elasticity, and the lungs are not sufficiently emptied of air in expiration; the chest movement is therefore small in the way of direct expansion. The chest may be bulged and barrel-like, with an up-and-down, rather than expansive motion, in respiration, or it may be flattened from atrophous emphysema of the lung. The former state is, in asthmatics, the most common, and usually indicates chronic bronchitis of some standing, with more or less of emphysema; but it is a mistake in asthmatic cases to infer a high degree of emphysema to exist merely because of the barrel-like form of the thorax. On percussion, the chest is extra-resonant and drummy, and in large-lunged emphysema it may not be easy to make out the area of cardiac dulness, in consequence of the heart being overlaid by resonant emphysematous lung. In those whose asthma dates from early childhood the lower part of the thorax is usually flattened and collapsed in consequence of imperfect expansion

of lung and pressure of the atmosphere on the yielding cartilages. Traction by the diaphragm on the lower ribs also helps to produce this drawing in of the lower chest.

It is well to note that, as Dr. Walshe has stated, at page 487 of the second edition of his work on the lungs, a condition of over-distension of the lung can be so far improved by treatment that the area of the heart's superficial dulness can be demonstrably increased. This fact should be borne in mind, or otherwise examination of the heart may lead to the erroneous idea that we have demonstrated enlargement of this organ instead of diminution of the lung, and we may be prophesying evil at the very time when we are doing manifest good by our treatment.

When the face becomes congested, and the jugular veins swollen, the urine loaded with lithates, and the ankles œdematous, then probably it will be found that the right side of the heart is becoming enlarged, and the case becomes one of very grave aspect.

Such is a short outline of some of the symptoms by which we may infer that a case of asthma is becoming more or less complicated with actual structural disease, and we must arrange

our prognosis according to the degree in which these symptoms exist, and the way in which they progress.

A certain amount of emphysema of the lung is nearly always found associated with asthma, and, indeed, the emphysema being hereditary,* is often, as a congenital infirmity, at the bottom of cases of asthma met with in young children, and which cannot be traced to any attack of pleurisy, bronchitis, or whooping-cough. Here the emphysema is the cause, not the effect, of the difficult respiration. In those other cases where the primary disease is purely nervous in its character, emphysema with dilatation of the air-vesicles of the lung is gradually brought about by the excess of respiratory effort, and is pretty uniformly observed in both lungs.

By degrees, after the emphysema has attained some extent and existed for some time, we get atrophic changes produced in the lungs. The nutrition of the air-cells suffers from insufficient supply of blood, because, as M. Pousseuille has shown, with excessive inflation of the lung a less quantity of fluid passes through the capillaries in a given time; the cell walls, therefore, become

* In the proportion of 60.4 per cent. (Fuller.)

granular-looking, fatty, lose their natural elasticity, and fail progressively in function.*

The lung failing in nutrition and power becomes increasingly liable to attacks of bronchitis and congestion; hence we usually find more or less of chronic bronchitis going along with emphysema, though, in the first instance, the emphysema is evolved without any bronchitis of necessity being present.

The majority of asthmatics who come under treatment present instances of asthma complicated with emphysema and chronic bronchitis, and when these conditions have for some time existed in a severe and aggravated form we get a class of cases of organic or complicated asthma, presenting features and symptoms different to those we meet with in spasmodic asthma, and requiring some modification in our method of treatment.

These are the cases that have been already alluded to, where the difficulty in the breathing is presumed to be of a paralytic rather than of a spasmodic nature. The labour with these

* I would refer the reader to an admirable paper on these points, by Dr. Hensley, in the St. Bartholomew's Reports, Vol. iii.

patients is in *expiration;* they cannot, to quote the words of a veteran member of the medical profession lately under my care for this kind of asthma, "get the air out of the chest." Another elderly man said it seemed as if a door opened to let the air in, but that he could not get it back again out of his chest.

The *expiratory* difficulty in chronic bronchial catarrh has been demonstrated experimentally by Waldenberg. See Ziemssen's "Cyclopædia," Vol. v., page 401, where is depicted Waldenberg's ingenious instrument for promoting expiration.

In these cases of paralytic dyspnœa the nervous irritability is exhausted by repeated attacks of spasm, and verging on paralysis, and though this be not a very promising aspect of affairs, yet it is certain that much good can be done, and relief afforded without any very complicated process of medication. The bronchial spasm of emphysema is probably, as Biermer thinks, reflex and due to over-distension of the lung cells.

I believe the use of sedatives in these cases is very limited; opiates indeed should be altogether avoided as harmful, and expectorants do little else than disturb and nauseate the stomach,

without rendering us much help for the chest. I have thought sometimes that the tincture of lobelia, in doses of thirty to sixty drops, the tincture of benzoin, and the tincture of larch bark, have done temporary good where there has been a good deal of puriform expectoration; but I have never seen anything like the permanent good effect from any of the above-named remedies that I have seen come of a careful use of tonics; all expectorant remedies being banished from the field of action at the same time. That which, from its occurring more than once, has impressed me as remarkable, is the circumstance that some of the patients of the class above described have a strong prejudice against taking tonics. An old gentleman who, under the belief that his asthma was due to suppressed gout, and who was often told that he "ought to have the gout," and had been thoroughly drenched with a variety of alkaline waters to no purpose, told me that whatever he took it must not be a tonic. The medicine he had, and the only medicine that he declared had ever done him good, was the tincture of nux vomica with dilute phosphoric acid; and we never entered upon any discussion again as to whether tonics were suitable or not.

It strikes me as very probable that this aversion of the emphysematous asthmatic to the use of tonics has its foundation in the circumstance of these remedies having been inopportunely or prematurely, and perhaps rather pertinaciously, tried at some earlier period in the case, when the indications were rather in favour of the use of anti-spasmodics alone; or at a time when some passing attack of true bronchitic inflammation might have required the temporary use of salines or expectorants.

It is when there is absence of true inflammation, and when expectoration and difficult breathing seem always to be worse as the patient gets weaker, that expectorants are of so little service, while bark, iron, and quinine come in as invaluable remedies permanently to benefit the dyspnœa by invigorating the general system.

When we consider further what the condition of the respiratory organs appears to be in these cases of old-standing complicated asthma, we shall see why tonics and remedies likely to improve nutrition are so strongly indicated.

The chest is in a constant state of over-distension, and the lungs themselves are over-full of air, just as they are when they are paralysed by sec-

tion of the vagus nerve, and there seems good reason to think that in some of these cases it is insufficient innervation of the lungs that is the cause of the dyspnœa rather than any great amount of emphysema of the lung substance. I have for a long time practically felt that we must recognise this paralytic form of asthma with very difficult expiration, as distinct from spasmodic asthma with closed lungs; and I observe that both Dr. Walshe and Dr. Fuller recognise the same distinction. That this form of asthma may be a true paralysis is proved by Dr. Fuller, who has traced some of these cases after death, and found very trifling emphysema of the lungs, though during life the dyspnœa had been excessive. ("Fuller on the Lungs," second edition, p, 375-6.) In these cases of dyspnœa the movement of the lower part of the chest-walls and especially of the diaphragm should be closely watched.

In one of the most highly developed instances that I ever beheld of pulmonary emphysema of, as I judged, atrophous kind, resulting from severe asthma of thirty years' duration, the patient remarked on the relief that he derived from the process of percussion over his chest. The thumping with the fingers over the chest seemed to

dislodge the stagnant air from the lungs, and so had a reviving effect on the patient. These are the cases that appear to get good from breathing a condensed and concentrated atmosphere in a chamber built for the purpose. Though there is much that is discouraging in the prospect of attempting to treat the case of one, the air cells of whose lungs are losing their natural elasticity and undergoing a process of degeneration, yet we must recollect that it is impossible to obtain absolutely certain evidence that real degeneration of tissue has set in, and in a large number of these cases of paralytic and emphysematous asthma the real and permanent good that can be done with the tincture of nux vomica, and with very small doses of strychnia, is unmistakeably great. The tincture may be given in doses of from three to eight or ten drops, and the liquor strychniæ of the British Pharmacopœia in doses of two to five drops.

My own plan is to keep to very small doses administered in a simple medium, such as mint water; and given thus carefully and watchfully I have never seen the slightest evil effect produced, though from what I have been told by one of the most careful and judicious prescribers in London, I feel bound to urge great caution and great

watchfulness when using strychnine itself, even in so small a dose as 1-30th of a grain persistently; further, as a precautionary measure, it is well so to arrange the prescription that there can never be more than half a grain of strychnine in the house at once.

Less efficacious than nux vomica and strychnine comes quinine, and this remedy when given to an asthmatic should be dissolved in phosphoric or nitric acid. Given thus, it may be set down as often a very useful medicine. Alum, and the liquid extract of ergot are medicines often serviceable in stimulating the feeble lungs to throw off the expectoration which collects and distresses the patient so much.

Iron is, as a tonic, especially valuable, and yet often the patients fear to take it, saying it will increase the cough. It rarely does this, and the tincture of the perchloride of iron, the sulphate of iron, and the citrate of iron, are all very valuable preparations, and go well with strychnine or with quinine. The sulphate or perchloride of iron may be given with some of the sulphate of magnesia or soda in cases where the liver and bowels are sluggish in action.

In the cases of those who are markedly worse

when there is much damp about, the iodide of potassium is worth a trial; and given with some ammonia and citrate of iron it forms a combination of considerable service.

It happens not unfrequently that in these cases of comp licated asthma there are, at night, attacks of spasm of the lungs—these must be be met by those remedies already mentioned, such as ether, datura tatula, and medicated inhalations. Sedatives at night do not interfere with other remedies during the day, but it is well not to be in a hurry to resort to them, for it is not uncommon to find such a medicine as nux vomica overcome spasm and give the patient a better night's rest than anything else that has ever been tried in the way of antispasmodic or sedative. Nux vomica and strychnine prevent the air cells becoming over distended, and so keep off one cause of reflex bronchial spasm.

I have tried warm medicated inhalations in some of these cases of emphysematous asthma, but unless the complaint be due to irritative bronchitis they do not do much good, and many patients say they seem to relax the throat and weaken the lungs. Creasote and the oil of pine seem the most promising substances for use in the inhaler.

The inhalation of compressed air, and its remedial power in asthma, with emphysematous lungs, will be referred to shortly. I may here observe, however, that the condensed atmosphere, by carrying a proportionately larger amount of oxygen into the chest, may relieve the distress due to the imperfect aëration of the blood in the lungs; the craving and hunger of the system for more oxygen being appeased by filling the lungs with a condensed atmosphere.

The fact that a condensed atmosphere keeps up the necessary supply of oxygen longer than one of ordinary tension, was observed years ago by Brunel when engaged in making the Thames Tunnel. This great engineer having occasion, at times, to descend under water in a diving bell, and now and then, in order to examine specially certain points in the works, quitting the bell for the water itself, found that he could remain under water without serious distress for a length of time that excited the alarm of his companions in the bell; this power was attributed to the fact of the lungs being inflated with the atmosphere of the bell, which was denser and richer in oxygen than that at the water's surface.

Another remedial agent in emphysematous

asthma, that has had its warm advocates, is electricity; and here, as in a host of other affections, this agent has been tried in the most empirical way, and on the vague hypothesis that asthma, being a nervous disease, is sure to be relieved by any power that acts in any way on the nerves, especially if these be tending to a paralytic state. I have little to offer from my own experience of the use of electricity in asthma, but I can understand that the continuous current, from one of Pulvermacher's chains, or any other source, might be of use in overcoming spasm. To the experience of my friend Dr. Althaus I am indebted for the following remarks on the use of galvanism in asthma:

"In true spasmodic asthma not complicated with emphysema or other structural lesions, but purely nervous in its origin, the continuous galvanic current directed to the pneumogastric nerve in the neck, near the carotid artery, appears to be an excellent remedy, which, as yet, has not been fully tried.

"The induced current applied to the same nerve is without effect; any form of electricity applied to the chest-wall is also ineffectual.

"The application of the continuous current to

the pneumogastric should be very gentle, and continue for not more than two minutes at a time.

"Long and strong applications irritate the nerve and excite an asthmatic attack."

In cases of emphysematous asthma, with general debility and absence of inflammation, a dry bracing climate is of the greatest possible service when there is a good deal of cough and expectoration, with languor of the system. In cases of great irritability and spasm of the chest one that is mild and warm is to be preferred.

The food should be light and nutritious, and the less alcohol the better; but if a stimulant must be taken, then claret, sherry, or *weak* brandy and water will agree best with the majority of cases. Casual attacks of flatulence and acidity are best met by the use of Belloc's charcoal lozenges, or by sucking a pastille of the Vichy salt, both of which remedies, from their convenient form, can be carried about easily by the patient.

CHAPTER IX.

Bronchitic asthma, or the dyspnœa of chronic and sub-acute bronchitis.—Sudden attacks of dyspnœa from obstruction of a bronchial tube.—Production of dilated bronchial tubes. —This is a troublesome and often permanent complication. — Treatment of bronchitic asthma. — Curative power of climate.—Importance of subduing any persistent inflammation. — Use of mercury and other remedies. — Illustrative cases.

THE object of the present chapter is to offer a few observations on the asthmatic complications of chronic and sub-acute bronchitis.

In these cases we have inflammatory action, *plus* spasmodic exacerbations, due to irritation of certain nerves. We see examples of these accessions of severe and dangerous spasm constantly in cases of laryngitis and croup; there is a true inflammatory process going on sufficiently dangerous in itself, and from time to time attacks of spasm in the breathing occur

that add greatly to the immediate danger of the patient.

An individual who from any cause has become the victim of chronic bronchitis is well known to be liable to attacks of severe breath difficulty in the event of his taking a fresh cold, or in consequence of any sudden change in the weather. The attacks vary in degree, but their symptoms are just those of asthma, and I have always put these cases down in my note-book as cases of *bronchitic asthma.* They may be of a gouty or rheumatic origin, and there may be more or less emphysema of the lungs present; but the most distinctive mark is the origin of the asthma in bronchitis, or some other inflammatory affection of the chest, the result most commonly of cold.

The breathing is always more or less difficult, and alterations of temperature, or of degree of humidity in the air, powerfully, and at once, affect the patient. At night there is often great distress, with sometimes complete inability to lie down in bed; or else the patient, after lying for a short time, suddenly has to start up in a fit of severe dyspnœa and spasm. Expectoration may be scanty or copious, with at times a

little blood, and the sputum itself may vary greatly, being at one time frothy and almost clear, at another time, within a few hours, it may be thick and yellow. These sudden variations seem to me oftenest noticed in cases of bronchitis complicated with rheumatism.

Sometimes the cough is violent and paroxysmal, and after a burst of coughing there follows a regular fit of asthma, the lungs are emptied of air by the cough, and remain for a time in a state of spasmodic contraction.

It should be remembered that it will sometimes happen that a patient (probably one rather advanced in years) ill with chronic bronchitis may be seized, without warning, with a sudden attack of extreme dyspnœa that brings him even to the verge of suffocation.

These seizures in the sudden manner of their invasion, and the equally sudden manner in which they pass off, resemble attacks of spasmodic asthma supervening upon chronic bronchitis. They are not, however, attacks purely spasmodic in their nature, but they are in many instances due to collapse of a portion of lung from plugging up of the air-tube which leads to this portion of collapsed lung.

The obstruction is caused usually by a lump of thickened mucus, like those firm round lumps of mucus that are sometimes expectorated by persons ill with chronic bronchitis, and which I have had brought to me in bottles by patients who were somewhat alarmed at the size and firmness of the ball of mucus which they had coughed up. This ball of mucus forming in an air-tube acts the part of a valve, permitting the egress of air in expiration, but preventing its entry into the lung by inspiration. Thus at last the portion of lung is perfectly emptied of air, and it collapses into one of those condensed masses that were called instances of lobular pneumonia till Dr. Gairdner explained their true nature and mode of production.

In this form of dyspnœa there will be great and marked difficulty in the act of inspiration, while that of expiration is comparatively easy. When the attack is perfectly developed it will be found that over the collapsed portion of the lung there is complete dulness on percussion, and no respiratory sound can be heard, when before probably bronchial râles were quite distinct.

These attacks may last from one to twenty-four hours, and as they pass away the breath sound will be observed to return and the percussion

dulness to subside at the affected part of the lung.

In a case related to me not long since by the patient, who is himself a physician, troublesome dyspnœa and discomfort on the left side of the chest, that had existed for some weeks, was in no way relieved till the patient coughed up a round ball of hard mucus. There seems reason to believe that this, by rendering a portion of the left lung non-expansile, has produced some limited emphysema which still remains.

The fibrinous casts of the bronchi expectorated in inveterate asthma, as well as in chronic plastic bronchitis, are familiar to most observers. When placed in spirit these casts spread out and look like the roots of some plant. Among a numerous and highly interesting collection of these casts, placed by Dr. Peacock in the Museum of the Victoria Park Hospital,* is one rather large fibrinous ramification coughed up by an asthmatic gentleman who is said to have afterwards died of phthisis. The probability is that these fibrinous masses, blocking up portions of the lung, may eventually give rise to breaking down and softening of the pulmonary tissue, just as fibrinous

* Transferred now to the Royal College of Surgeons.

deposits from the blood have been shown to do by Andrew Clark and Niemeyer; and thus the patient dies with all the symptoms of softening and excavation of the lung. Some of the best examples of fibrinous expectoration that I have seen have been in cases of asthma with atrophic emphysema of the lungs; the nutritive tendency of the system being towards fibrin rather than pus formation. These are the cases where after a while one gets dulness at one apex from fibroid condensation of lung, and at times there follow hæmoptysis, and all the symptoms of gradually advancing phthisis.

There is another pathological state met with often in these cases of bronchitic asthma, associated too with emphysema, and that is dilatation of the bronchial tubes. The presence of dilated bronchial tubes in the chest of a grown-up person is likely to be a permanent evil, and will maintain the tendency to bronchitis and dyspnœa.

Inflammatory action in and around the air-tubes after long continuance leads to exudation of contractile lymph; which, if on the tissue external to the tube, draws upon and dilates the tube, while at the same time it renders the lung tissue less expansile. When the inspiratory efforts

become powerful and strong the tubes are distended more and more, they cannot contract as they are wont to do in health, they yield and stretch under the strain put upon them, secretion stagnates in them in increasing quantity, their tissue becomes weak and degenerate, and dyspnœa increases and remains abiding.

The physical signs of enlarged bronchial tubes are pretty well known, and it is in the infra-mammary regions where these should be especially sought; here we may find want of expansion, dulness on percussion, occasionally a true "crack-pot" note, with hollow bronchial breathing and very prolonged expiration. I have in rare instances of old chronic bronchitis, following on neglected pneumonia, observed true amphoric breathing over the bases of the lungs, apparently due to globular dilatation of the bronchial tubes. This condition was exceedingly well marked in the case of a man under Dr. Risdon Bennett, in Victoria Park Hospital, some years ago. This man had been ill some years previously with pneumonia, and he was sent up from the country to the hospital on account of the bronchitis and asthma which clung to him; he was somewhat benefited by treatment, but with so much struc-

tural change it was impossible to look for more than some relief to the more urgent symptoms.

Provided there be no great structural change in the way of dilated air-tubes, emphysematous lungs, or enlarged heart, we may look for very satisfactory results from treatment in these cases of bronchitic asthma.

I suppose there is no remedy so radically curative as climate. I have seen many cases of chronic bronchitis with much irritation of the chest, scanty secretion, and tendency to spasmodic difficulty in the breathing, improve speedily, progressively, and permanently at such places as Hastings, Ventnor, and Bournemouth. My own observation and experience of climates for bronchitic asthma is limited mainly to these places, as I find them to succeed so well; but there are other well-known resorts possessing a similar mild sedative air, such as Torquay, Sidmouth, and Penzance, which may do well for the bronchitic invalid, though they are not good for one who is far gone in pulmonary consumption, save for the purposes of promoting a euthanasia.

Cases with highly-developed emphysema, languor of system and profuse secretion, must avoid all places that are of a sedative and relaxing

nature, and seek some of the dry bracing places like Harrogate or Malvern.

The point wherein the medicinal treatment of bronchitic asthma in a measure differs from that of emphysematous asthma, is that we have a smouldering kind of low inflammatory action as the root of the mischief; and as we often have to deal with thickenings and exudations of inflammatory origin, it is here that some of the absorbent remedies, such as mercury, the iodides, and the alkalies, come in most happily before we resort to the more tonic class of medicines.

The clearing off of inflammation, and of the products of inflammation, I regard as a most important point in the curative treatment of cases of bronchitic asthma, and for this purpose we have among our drugs the various preparations of mercury which are here most valuable. I may say that I have never in any case given mercury so as to at all affect the mouth. The way in which I use it will be easily seen by a perusal of the cases of bronchitic asthma appended to this chapter.

When the bronchitic state of lung is subdued any emphysema which may remain must be treated on the principles already enunciated.

The following are selected from the notes of a large number of cases of bronchitic asthma; they will serve to illustrate those points in the treatment of the complaint to which attention has been already drawn.

Cough and nocturnal dyspnœa, slight benefit from cod-liver oil and iodide of iron, cured by mercurials.

CASE XV.—Robert R——, æt. 16 years, came under treatment October 10th, 1865. He is a pale, light-haired youth, and his complaint is of cough, and much thick yellow expectoration consequent on neglected cold. He has never raised any blood, the tongue is clean, tonsils very large, chest resonant, but some few crepitating sounds are heard in upper part of left lung, Pulse 120

Till October 26th he was treated with cod-liver oil and iodide of iron, and at first he improved on these medicines; but on October 26th he seemed to have taken some fresh cold, for the cough was very severe at night, and after the fits of cough he had asthmatic wheezing often so loud as to be audible in the next room. Pulse 120, bronchitic sounds to limited extent in left lung; he does not himself consider that he has improved on the treatment thus far.

For the next fortnight he took every night a pill of pulv. scillæ et pil. hydrarg., of each two grains; he continued his cod-liver oil, and took some nitrate of potash and vin. ipecac. with mucilage, three times daily.

November 8th.—Rests much better, much less spit, not near so much cough, breath easy, tongue clean, pulse still keeps up. To take pil. conii. co., five grains, in place of pil. hydrarg.

November 23rd.—He had some iodide of ammonium in a mixture, and on December 14th he was discharged free from cough, and only complaining of dyspnœa on exertion; further than this the note does not go, for I did not then know I should ever publish the case.

The point of interest in this case was the absence of all real improvement till the man got the small doses of mercury. I suspected strongly that the left lung was about to become tubercular, but have had no reason to believe that it ever did become so.

That paroxysmal asthma, of very violent nature, in young people, is at times, a sign of commencing miliary tubercles in the lungs, is a point on which we have certain evidence from recorded cases and *post-mortem* examinations.

Dyspnœa due solely to chronic bronchitis, and soon removed by mercurials.

CASE XVI.—Henry W., æt. 45 years, seen October 7th, 1867. For some months has had severe cough night and day, with thick expectoration. At night much difficulty in the breathing and profuse sweating. Pulse 80; face pale.

Chest resonant; respiration generally feeble, with some sonorous and sibilant rhonchus.

℞ Pil. hydrarg.
Pulv. scillæ, āā, gr. ij. pil. om. nocte.

℞ Vin. ipecac., ♏ viij.
Tr. opii., ♏ viij.
Potass nitrat., gr. v.
Mist. acac., ℥j., m. t. d. s.

He had no other medicine, and on October 28th he was let go, describing himself as quite well, able to sleep quietly at night, and free from cough. The cure in this instance was so complete, that the man desired to present me with an article of his manufacture as a token of his satisfaction.

CASE XVII.—Mrs. R., æt. about 40, seen September, 1872. For the last two months has had violent cough with frothy expectoration. At night the difficulty of breathing is extreme, and she has to be propped up in bed with pillows.

No emaciation; pulse 100; face pale; rather anxious looking; eyes somewhat suffused; tongue furred behind.

Appetite not good; is very careful and abstemious in her manner of living.

She has already taken much medicine, but the severe attacks of spasmodic dyspnœa at night grow worse.

The chest is resonant; its movement is up and down rather than a true expansion. Sonorous râles are heard over both lungs, with very prolonged expiration.

Sedative inhalations were ordered, and a mix-

ture of hypophosphite of soda with carbonate of ammonia.

Slight improvement took place in the course of the next two weeks.

September 22nd.—I saw her in consequence of a fresh cold, and found the dyspnœa extreme. Pulse 100; moist râles over both lungs. A pill was ordered as follows, to be taken every night:—

℞ Pil. hydrarg., gr. ij.
Pulv.-ipecac., gr. j.
Ext. conii., gr. ij. M. om nocte

And a mixture of carbonate of ammonia with iodide of potassium.

In eight days' time the report sent was, "Progressing rapidly towards recovery," and she did recover of this attack, though the chest remained very susceptible to any change of temperature. Death took place eventually from apoplexy.

Chronic Bronchitis with severe asthmatic paroxysms cured by mercurials.

CASE XVIII.—Harriet J——, seen October 27, æt. 35 years, has from childhood suffered with severe cough and expectoration; now she has to sit up every night from ten to four in the greatest distress from breath difficulty. She has lost flesh, looks pale and worn. Pulse 136. Tongue clean. Expectoration frothy.

Chest fairly resonant. Respiration coarse, mixed with sonorous and sibilant rales; expiration prolonged.

℞ Pil. hydrarg.
Pulv. scillæ, āā gr. ij. pil. om. nocte.
Ipecac. mixture three times daily.

After seven days of these medicines she was able to lie down with ease. Pulse 96. "Not near so much spit." Urine clearer and not so turbid.

November 10th.—To take iodide of potassium and bark.

November 24th.—She declares herself free from all breath trouble at night, cough almost gone, slight yellow expectoration. Pulse 88. Appetite good. Let go cured.

Quick pulse, feverishness at night, and high-coloured urine, with paroxysmal cough and scanty frothy expectoration, were indications for mercury, and the iodide of potassium mixture followed on the mercurial course with first-rate result.

The following cases illustrate the development of bronchitic and spasmodic asthma in early childhood:—

Bronchitic Asthma in a child. Slight relief from treatment.

CASE XIX.—Christian S., æt. 10 years, not thin or emaciated, and of a healthy family; has suffered during the last three years with severe attacks of dyspnœa in winter and summer alike.

Hard cough night and morning and "rears up" at night with the fits of difficult breathing. His mother says he has from birth been weak in the chest.

Pulse 84, tongue clean, pain felt chiefly under sternum. Thorax is extra resonant, a little exertion soon brings on the dyspnœa, and then the

upper part of the thorax is drawn up and moves but little, while the lower parts and the false ribs open out powerfully in inspiration.

Râles with prolonged expiration noted all over chest; but decidedly most marked under left clavicle.

Commenced treatment April 16, 1868, thus:—

℞ Liq. Fowleri, ♏ j.,
Hst. Calumbæ c. Soda ℥ss. t. d. s.
Pil conii. co., gr. ij. om. nocte.

May 7th. Has continued the treatment, with the addition of potass. iodid. gr. ij. to his mixture, but is not any better; turns almost black in the face with dyspnœa at times, and has coughed up blood. A mixture was ordered with some of the hypophosphite of potash. Slight amendment followed upon this, and soon after he ceased attending the hospital.

Severe spasmodic Asthma with emphysema.

Case XX.—Master V. D., æt. 7 years, seen by me August, 1866, in consequence of severe fits of spasmodic asthma, coming on chiefly at night, with lividity of face.

The boy is very intelligent and active, face pale, some enlargement of cervical glands, chest everywhere fully resonant, sibilant wheezings heard with prolonged expiration. Pulse 86, tongue clean. Any excess of food always brings on the asthma. Suffers with nocturnal incontinence of urine.

This patient has been pretty constantly under my observation up to the year 1876, and still

suffers with asthma. At times in damp and cold weather he gets bronchitis, and the asthmatic fits are then more severe; there is now much less lividity during the fit than there used formerly to be.

The extra resonance of the chest, and the very feeble inspiratory murmur with prolonged expiration, render it probable that this case is complicated with emphysema.

An immense variety of medicines were tried on this patient, and of these the most valuable were found to be Fowler's solution—belladonna, nitric acid, and iodide of potassium.

Inhalation of a mixture of verbascum and stramonium, soaked in a solution of nitre and then dried, served to relieve the paroxysms; Dowling's paper was also of great value. Strong coffee I observed to act well in relieving a severe fit which the young patient had while at the seaside.

In the case of C. H., a little boy, six years old, who had fits of mild asthma at night, with incontinence of urine; after failing to do any good with conium and hypophosphite of potash, I at last relieved him very greatly of his asthma, and cured his enuresis by tinctr. lyttæ c. tr. ferri, of each 5 drops three times daily, in water. In the previous case these medicines had no effect.

In cases of spasmodic and bronchitic asthma occurring in young children, I believe it to be of much importance to recognise, and as

far as possible cure, whatever inflammatory condition there may be going on in the chest, care being taken to distinguish between this and any reflex pulmonary spasm which, in a young infant, may be due to dentition or other source of nervous perturbation. Next, it is of vital importance that the child should be placed in a suitable climate, and be properly cared for in the way of clothing and diet. When these conditions are properly fulfilled, we may reasonably hope to see the disease subside, or become much mitigated in severity by the lapse of time. Without attention to these matters the child will most certainly grow into disease rather than out of it.

CHAPTER X.

A short account of the effects of asthma on the heart and blood vessels.—Enlargement of the right side of the heart.—Symptoms and signs.—Cardiac dyspnœa.—Means to be employed for relief.—Medicines.—Digitalis.—Salines.—Tonics.—Blood-letting at times necessary to relieve the right side of the heart.—Salutary effect of a dry climate.—Effect on the circulation of compressed air.—Reichenhall and its air baths.

ALLUSION has been already made (p. 19) to, the extreme smallness of the pulse during a bad paroxysm of asthma, as a sign that there is a stoppage of the circulation through the lungs, causing but a scanty supply of blood to enter the left ventricle and arterial system.

Two circulations are constantly going on in the lungs—the one of air, the other of blood,—and one cannot be checked or arrested without the other participating in such stoppage. In asthma, the aërial circulation being in arrest,

the blood circulation suffers in consequence. In heart disease, the blood circulation through the lungs being impeded, the aerial circulation suffers in consequence, and we get cardiac asthma as the result.

Frequent stoppage of the flow of blood through the lungs, with venous engorgement and stasis, after a while produces dilatation of the right side of the heart, and this is the most common cardiac effect of protracted attacks of dyspnœa and asthma. When the heart becomes affected the form of dyspnœa undergoes some modification. Without being periodic, as pure asthma often is, it is irregularly and suddenly paroxysmal, and during these fits there is a look of alarm about the patient, with much gasping and panting. The paroxysm is short, but leaves a good deal of permanent dyspnœa behind, with more or less passive bronchitis and tendency to pulmonic congestion. Examination of the chest may show the heart's impulse diffused and readily felt at the epigastrium; the area of dulness is increased to the right, there is want of tone in the first sound of the heart, the jugular veins are full and prominent, the complexion dusky and more or less vivid, signs of congestion of

lungs, liver, and stomach appear, the feet swell, the bowels are costive, the urine turbid, and the nights are especially disturbed.

Such are the signs of an engorged right heart and venous system; and when they appear in the case of one who is asthmatic they are of evil augury, as showing that the organic complications of the asthma extend beyond the lungs themselves to the heart and circulatory apparatus. The general plan of treatment should be to relieve congestion, and then to try and strengthen the weak and failing structures.

An excellent medicine, in these cases, is found in the infusion and tincture of digitalis. For years I have used these preparations with most satisfactory results, and never yet saw any danger arise from the asserted cumulative action of the drug, though I must confess to having heard of some mishaps when the digitalis has been persevered with in full dose for a long time.

From two to four drachms of the infusion, or five to twenty drops of the tincture, with some nitrate of potash, nitrous ether, and camphor water, is my own standard form, save when I use the pill of powdered digitalis one grain, and powdered squill two grains.

Various saline combinations, sometimes with a diuretic, sometimes with a laxative intent, come in very serviceably to relieve venous congestion, and can be arranged to the judgment of the physician. As soon as there seems to be relief to the more urgent and oppressive symptoms it is well to get in some iron or bark. The iron may be given in a small dose of one grain of the sulphate, or ten drops of the tincture, with sulphate of magnesia, in peppermint water. The bark may be best given with iodide of potassium, and aromatic spirit of ammonia.

It will now and then—when the right heart is much engorged and the oppression in breathing very great—be necessary to draw a little blood. From six to eight ounces taken from the arm relieves occasionally, as nothing else will. Stimulants, so commonly and often so profusely given, merely seem to help the left ventricle to pump the venous system all the more full of blood, while a little relief by the detraction of blood does wonders to restore the balance of the circulation. If venesection be objected to, a few leeches over the lower part of the sternum will often give ease to the breathing.

The heart being in so large a measure influ-

enced by the action of the lungs, we must not forget the importance of a perfectly dry warm climate, and to the efficacy of this as a means of prolonging life I can fully testify, and that, too, when the organic heart mischief was unmistakeable.

Speaking of the inhalation of a suitable atmosphere, brings me here to mention the condensed air-chamber, for it is in cases of dyspnœa, with venous plethora and congestion, where the condensed air claims to be especially curative. At Reichenhall in Bavaria, Montpelier, and Wiesbaden, these air-chambers are to be found at work; and for a full and concise description of the mechanical arrangement of the chamber I must refer the reader to Dr. Burdon-Sanderson's article on "Reichenhall and its Compressed Air Baths," in the *Practitioner* for October, 1868.

The pressure employed in Mr. Mack's Reichenhall Baths is equal to one atmosphere and a half; *i.e.*, about forty-five inches of mercury, or about twenty-one pounds on every square inch of surface. The patient remains in the air-chamber an hour and forty minutes; of which time about forty minutes are occupied in gradually and cautiously increasing and diminishing the pres-

sure. The physiological effect of the compressed air bath on the circulation consists in its altering the distribution of the blood, so that while the quantity contained in the veins and auricles of the heart is diminished, that in the ventricles and arteries is increased, and thus the balance of the circulation is restored. Practically it is found that cases of dyspnœa, with old standing emphysema and bronchitis, over-fulness of the venous system, and emptiness and diminished tension of the arterial system, are relieved by the action of the compressed air.

Dr. Vevinot, in his experiments with compressed air at Nice, noted great retardation of pulse and respiration, the former falling, in one instance, as low as eighteen in the minute; the secretion of the skin and aërian mucous membrane was at the same time checked, while that of the kidneys was enormously increased.

In the case of workmen employed in building the Mississippi bridge at St. Louis working in an air chamber, at a pressure of as much as sixty pounds to the square inch, Dr. Bauer observed that many were stricken down with paraplegia, and some died with inflammation of the brain, cord, and membranes.

From trustworthy information, recently obtained from an engineer of much experience among men working in diving bells and cylinders, it appears that all men conscious of any kind of chest weakness, specially of a consumptive nature, learn, by experience, to avoid this kind of labour.

To descend in a bell with anything like a cold or bronchitis about one is described as agony, relieved sometimes by free bleeding from the nose. Work at foundation-laying in the air cylinder is more trying than diving-bell work, because the pressure is higher, and comes upon one more suddenly. Six minutes in an air cylinder has been known to bring on a profound faint, with blueness of lips, and apparent death, recovery being very protracted.

These facts show how powerful is the influence of compressed air on the circulation, and what caution is requisite when employing it therapeutically.

Gradually to increase and diminish the pressure in the bath is most essential, for without care on this point it may happen that a patient who may have felt much relief while in the air-chamber, will experience a most trying reaction,

in the way of dyspnœa, after his return into an ordinary atmosphere. In one case under my care this reaction proved so severe that the bath had to be given up entirely; though, while confined within it, the patient would fall into such a perfect and tranquil sleep as he had not had for many years.

The general objection that I find made by nearly all who have tried the compressed air-bath is the very temporary and transient character of the relief which it affords.

Of the ingenious contrivance of Waldenburg, described in Ziemssen's "Cyclopædia," vol. v., where the patient inspires condensed air, and expires into rarefied air, I have not any experience.

The following observations on the use of the compressed air-bath are from an article translated by the author for the *London Medical Record*, and published in that journal for June 11, 1873:—

Canuet, Moutard-Martin, and others on the Treatment of Asthma by Baths of compressed Air. *

A paper was read by M. Canuet, at a recent meeting of the Therapeutical Society of Paris, on

* *Gazette Médicale de Paris*, May, 1873.

a case of humid asthma of eighteen years' standing, and due to a severe double broncho-pneumonia, which was cured by means of the compressed air-bath, and the paper was followed by an interesting discussion. At first the fits occurred at irregular intervals, as much as six months sometimes elapsing between them. The spasmodic character of the fit was well marked, and after several days of spasm this would give place to severe catarrh. After about ten days the attack passed away, the respiration became normal, and there remained only a little grey morning expectoration. The catarrh gradually increased, and great benefit was derived from two visits to the waters of Cauterets. Eight years from the development of the malady, the catarrhal susceptibility became extreme, and every month there were one or two attacks, generally lasting ten days. The patient now was troubled with flatulent dyspepsia, and became very weak and anæmic. A third visit to Cauterets, and subsequently one to Eaux Bonnes, were alike unproductive of relief. It was observed that, as the malady became chronic, the spasmodic element became less predominant, and that, too, before the administration of such remedies as arsenic and the iodide and bromide of potassium.

It was under these conditions that the compressed air-baths were first tried in October, 1871, under the direction of M. Leval-Piquechef. During the first trial, with a pressure of 7 centimetres (3·36 inches) of mercury, the pulse ranged from 72 to 80, and the respirations were 18 in the minute. Gradually, the bath being taken daily,

the respirations diminished; and at the twelfth sitting, under a pressure of 7 centimetres, they had fallen to 9. The appetite and strength improved. During the treatment, the attacks that did occur were milder.

At the thirteenth sitting, with a pressure of 15 centimetres, the pulse fell to 68, and the respirations to 6. In ordinary air the numbers were 76 and 18. After three series of thirty baths each, ninety in all, the general state was very satisfactory; appetite and sleep returned. Considerable atmospheric variations, cold, and thaw following, were passed through without annoyance; a little bronchial expectoration in the morning being the only remnant of the asthma.

With respect to the mode of operation of the compressed air, it is hardly probable that the good was done by mere mechanical pressure of the air, which rarely was 20 centimetres over what is normal. It seems that we must look to the oxygen as the active curative agent. Increased supply of oxygen, without increase of atmospheric pressure, has proved beneficial in the spasmodic complications of anæmia and chlorosis.

Placing patients in a bell-chamber was observed to overcome the paroxysms of whooping-cough when the disease was in its decline.

M. Moutard-Martin had, during six years, studied the effects of compressed air baths. The complete repose of the bath he believed to be the cause of the diminution of the respirations, though he would not deny that a small amount

of sedative effect was produced by the compressed air. In the bath one respires freely without apparently introducing much air into the lungs, and yet, strange to say, these organs dilate ; for, if their capacity be measured before the treatment, it is found that, at the end of a certain time, they will have increased in capacity by half a litre. This fact is not easily explained. The effect of the baths on the circulation is calming, and in humid asthma and bronchial catarrh, they are valuable curative agencies. M. Moutard-Martin mentioned the case to Dr. Jarrin, who for fifteen years had had asthma, with cough and abundant expectoration. Emphysema was highly developed in the chest. Not without fear, this doctor submitted himself to the action of the compressed air-bath, and eventually derived so much benefit that he was able to resume the exercise of his profession. In another case, that of a lady with severe asthma, at the first trial the pressure of air in the bath was too strong, and no good resulted. A more careful trial under less pressure gave satisfactory results; and, after six months of treatment, the asthma only came on under the influence of powerful exciting causes. This lady is now 19 years old, and hardly has two attacks of asthma in the year. Regulation of the degree of pressure seems very important, a pressure of 37 centimetres causing intense sense of suffocation. Of the effect of compressed air in anæmia, M. Martin was able to speak in high terms. A young girl, aged 20, had extreme anæmia, palpi-

tations of the heart, shortness of breath, much pallor and œdema of the feet. Iron, quinine, and baths did no good. The compressed air-bath was employed; in fifteen days a great amelioration in all the symptoms was observed, and in three months a complete cure was established. In another case, that of a child aged 9 years, with waxy pallor of the skin, anæmic, and of excitable, petulant temper, twenty baths were tried, and some benefit appeared to result. At this time, however, feverish symptoms set in, and the parents would not allow a further trial of the experiment. Curious to say, the *femme de chambre*, who always accompanied the child into the air-chamber, was completely cured of a state of extreme anæmia by this chance exposure to the series of twenty compressed air-baths. In the declining stage of whooping-cough the compressed air-bath was of service. The daughter of M. Nélaton was cured by it. M. Martin could not think that it was the increased inhalation of oxygen that did the good. He had himself tried inhaling oxygen to relieve asthma, and found it to make him worse, and he had seen a similar experience in other asthmatics who had made use of oxygen inhalations. In the air-chamber one did not inhale more, perhaps even less, oxygen than in ordinary air, the respirations in the chamber being so few in the minute.

M. Martineau alluded to the observation of Jourdanet, who supposed that the gaseous interchange between the blood and the air was modified by degree of pressure of the air.

Observations made by G. V. Liebig show that variation in the pressure of the atmosphere, *cæteris paribus*, produces little effect on the respiratory process as a whole, the greater number of respirations made under ordinary pressure being exactly compensated for by their greater depth under increased pressure.

I may refer the reader for very complete information respecting the structure and management of a compressed air-chamber to Dr. Grindrod's work on Malvern.

The duration of the Malvern bath is two hours. The air is gradually increased to the maximum of pressure during the first half-hour. During the last half-hour the pressure is gradually reduced, so that the patient is under full pressure for the space of one hour.

Dr. Grindrod finds, by experience, an increase of half an atmosphere, or $7\frac{1}{2}$ lbs., on each square inch of surface to be best adapted for the production of relief to the patients. This is about the same degree of pressure that effects such good results in Mr. Mack's bath, at Reichenhall.

CHAPTER XI.

Hay asthma or summer catarrh.—Researches of Dr. Blackley on pollen as the cause of this complaint.—Treatment of hay asthma.—Removal to the sea-coast.—Fumigations, inhalations, and medicated snuffs.—Internal remedies.—Hay fever different from hay asthma, and might well be called solar fever.—It is a neurosis, but a paresis rather than a spasm.—Value of tonics in treatment of solar fever.

In this chapter a few remarks will be offered on that form of specific asthma known as "hay asthma," "hay fever," "summer catarrh," and rarely and less appropriately as "summer bronchitis;" for it is a disease with which real bronchitis has nothing whatever to do, since the wheezing and bronchial râles, that may, in bad cases, be heard in the lungs, are due to spasm, and not to inflammation.

We are indebted to the researches of Dr. C. Blackley and Dr. Pirrie for showing that summer

catarrh and hay asthma, are due to the emanations of certain grasses affecting the mucous membrane of susceptible persons. The complaint recurs at intervals, and is promptly excited when the individual comes in contact with the aroma of a hay-field or a meadow of flowering grasses. The *nardus stricta* and *anthoxanthum odoratum* are the grasses whose emanations, set free by the sun's rays, are specially provocative of this asthma. Some have thought that these grasses evolve benzoic acid, but I have never seen it proved to be this acid that excites hay asthma.

With symptoms of spasmodic asthma, there is pricking in the throat, running from the eyes and nose, irritation and sneezing, frontal headache and mucous flux and catarrh.

From these last symptoms the disease obtains the name of "summer catarrh," and with a predominance sometimes of asthma, sometimes of catarrh, the complaint is apt to continue in an intermitting way during the summer-time, or as long as its specific exciting cause has chance of operation.

The experimental researches of Dr. Blackley *

* See notice of Dr Blackley's work, by Dr. George Johnson, in *London Medical Record*, June 18, 1873.

have proved that the pollen granules of various plants, when inhaled, irritate the naso-pulmonary mucous membrane, and so cause the symptoms just described. Dr. Blackley, himself a sufferer from hay asthma, was a fit subject for experiment. His experiments were made with the pollen of the grasses, and they were attended by such definite results as to show that pollen is the most powerful if not the sole cause of the malady. A small portion of pollen powder applied to the lining membrane of the nose invariably produced all the symptoms of hay fever, the severity and continuance of which were dependent on the quantity of pollen applied. Thirty-five natural orders of plants were tried, and the pollen of all possessed in varying degree the power of producing hay asthma. The granules of pollen swell and burst when in contact with the nasal mucus, and so, by absorption, the solution is conveyed into the system, producing feverishness and general constitutional disturbance. Dr. Blackley thinks that the dyspnœa of hay asthma is due to submucous œdema excited by the irritant action of the pollen; this, I think, is doubtful, for experiment has proved that irritation of the Schneiderian membrane of the nose will, in certain persons, cause

spasmodic asthma, a fact I have lately seen exemplified in the case of a gentleman who found the irritation of his nasal mucous membrane, caused by the removal of a polypus, induce fits of asthma.

The demonstration of the power of pollen to cause asthma is very interesting in connection with Trousseau's account of his own bad attack of asthma while he was watching the coachman measuring the oats up in the loft. The distinguished French Professor considered mental emotion to have been the reason why the dust of the oats affected him so suddenly and severely, but in all probability it was the dry pollen of flowering grasses that he inhaled in the dust that was the true exciting cause.—*See* Trousseau's "Clinical Medicine," vol. i., p. 626.

The most effective treatment of summer catarrh is for the sufferer to remove from the neighbourhood of the source of his trouble, and he will be most out of harm's way probably on the sea-coast. If from any cause removal to the coast be impossible, residence in a town may be tried, and recourse had to various remedial measures, local and general.

Smoking tobacco in cigar or pipe is a well-

known source of relief to those who are liable to hay asthma. The practice should be to smoke as soon as ever the attack begins to threaten and at no other time; thus the full curative effect of the remedy is obtained.

As a simple means of local medication, I have often recommended the use of Bird's inhaling pipe, the sponge being well soaked in spirits of camphor, to which some ether may be added. So far as present experience goes there is much comfort for those who are liable to hay asthma in this use of the pipe. Cigars made of the rolled-up leaves of *Eucalyptus globulus*, camphorated cigarettes, and the cigarettes of Espic, or Joy, may be trusted also as means of relief.

By means of the instrument designed by Mr. Barker, and mentioned at page 65, powder of datura mixed with camphor can be burned in a pipe-like receptacle, and then, by working a small hand-ball, active combustion is kept up in the pipe, while the same movement projects the smoke forcibly from the free end of the tube, so that it can be driven well into the nostrils, and act as a very efficient local sedative.*

The addition of a grain of powdered opium to

* This instrument is kept at Messrs. Savory and Moore's.

the combustible powder may be tried as a means of increasing its activity as a sedative. The Chinese opium smokers use a piece of the watery extract as big as a pea, and this usually produces very decided intoxication. As the temperature of a pipe is sufficient to decompose morphia new products are probably formed, and to them the powerful effects of opium smoke may be due. The late Dr. John Snow, in 1851, made many experiments on the inhalation of opium smoke, and he found morphia more agreeable to inhale than crude opium. Dr. Snow found that he could inhale the fume of half a grain of morphia without discomfort.

The relief that is obtained in hay asthma from the use of Espic's cigarettes is, I expect, due to the watery extract of opium they contain. Dr. Blackley found that the application of an ointment containing opium to the nostrils gave him relief from his attacks of hay asthma, and I know of other cases where opium, applied locally as ointment, lotion, or powder, is the only remedy on which the patients place reliance.—*See* Formulæ.

When the flux is very troublesome and obstinate carbolic acid or creasote inhalations may be used. Volatilisation of carbolic acid, drop by drop

on the hot plate of one of Savory and Moore's carbolic acid vaporisers, is a most valuable resource. The apparatus is set in action near the patient, gives him no trouble, and he can take as much or as little of the vapour as he pleases by regulating the distance of the instrument. If there be an aversion to a warm inhalation, then carbolic acid or creasote-water, or a solution of sulphate of zinc, or alum with sulphate of iron, may be inhaled as spray from Clark's hand-ball atomizer.—*See* Formulæ.

Bathing the nostrils and mouth with camphor julep is a useful practice just before going out in the heat of the sun. Helmholtz has drawn attention to the presence of vibrios in the mucous secretion of summer catarrh, and recommends the use locally of solution of quinine.

Solution of sulphate of quinine in the proportion of 10 grs. to a pint of distilled water may be used to the nasal passages by means of a spray atomizer, or of Mayer and Meltzer's nasal douche. A solution of salicylic acid in the proportion of 1 to 500 of water, may be employed in the same way as the quinine.*

I have tried iodine inhalations for the relief of

* Dr. Patton in *Practitioner*, Sept., 1877.

summer catarrh, but have not found them of much use. Chlorine vapour evolved from moistened chloride of lime is well worth trying and has good testimony to its utility.

Iodized camphor snuff, invented by Barrére of Toulouse, is made by shaking together powdered camphor with one hundredth of iodine by weight, till the two bodies have combined into a brown powder. This may be carried in a small bottle, and a pinch occasionally taken by the nose; it causes at first some smarting, but from what experience I have as yet made with this snuff I feel encouraged to recommend it. Another snuff that I have employed with advantage, is made by triturating 5 grains of iodide of sulphur with 3 drms. of pulv. glycyrrhizæ. This, like the iodized camphor, at first may cause transient irritation. The use of Scotch and Irish snuff may be tried in cases of summer catarrh as a means of blunting the exquisite sensibility of the nerves of the nasal mucous surface. The vapour of weak solution of ammonia may also be inhaled with the same intention.

Of internal remedies one of the best I believe to be Fowler's arsenical solution, taken in doses of two to five drops three times a day in water.

Sulphate of iron, with or without sulphate of quinine, is most valuable if there be much debility, and in a few cases iodide of potassium, or else nitric acid seems to render real service. The ethereal tincture of lobelia in full dose is reported a good anti-spasmodic in hay asthma, and the same has been said of dilute hydrocyanic acid and aqua lauro-cerasi, but these last are very depressing to the system.

The complaint to which the name of "Hay Fever" is specially applicable differs in some respects from the "hay asthma" that we have been describing, and I have been able to recognise the distinction before I knew how ably it had been pointed out by Dr. Pirrie. True hay fever is a congestive more than a spasmodic disease, and is apt to attack the *habitués* of town when they go in the heat of summer to the country. It appears, in some instances, as a mere transient uneasiness, with itching of the eyes and nose, some irritation of the throat, and, perhaps, a little headache and oppression at the chest. These slight symptoms may vanish in a short time, or after the use of a stimulant, and no more is thought of them.

In more thoroughly developed cases there is distinct fever of a somewhat remitting character,

with now and then a tendency to shiver; there is also giddiness, heaviness of the head, with oppression at the chest and difficult respiration.

There may be catarrh, which appears due to a congested state of the mucous membrane, and at times mucous râle may be heard in the lungs.

This form of complaint seems due to solar heat, and I have thought it should be called summer fever or solar fever rather than hay fever, for I doubt if the smell of grass or hay has much to do with its causation, and I have known persons affected with this fever on arriving at the sea-side from London. The disease is tedious, very apt to recur, and not controlled so completely by change of air as true hay asthma is; neither do local applications appear to be of very marked service, though they may be tried in the forms already suggested, to palliate symptoms. The fact appears to be, as Dr. Pirrie has said, that this affection is a paresis of the nervous centres. This I judge from the general symptoms, and from the fact that expectorant anti-bronchitic medicines are without effect on these symptoms, while tonics, and especially small doses of strychnine, as well as nux vomica, quinine, and sometimes arsenic, may be relied upon as useful and efficacious remedies.

Liquor ammoniæ, in dose of 10 to 20 drops in milk, will often give much relief.

If there be much painful congestive headache, it will be well to try the hydrobromic acid, as recommended by Dr. Milner Fothergill. This acid is obtained by decomposing a solution of bromide of potassium by means of tartaric acid (*see* Formula in *Pharmaceutical Journal*, November, 1877), so that the acid remains in solution, and can be filtered off from the deposit of acid tartrate of potash.

The usual dose of hydrobromic acid is 15—20 minims, with water and syrup, and of its great value as a remedy in relieving congestive headache, with noises in the ears, I have already convinced myself. In a case of laryngismus stridulus, due to congenital malformed heart, I have, at Dr. Fothergill's suggestion, employed the acid with a well-marked effect in stopping the attacks, but they returned whenever we omitted the medicine. Quinine may be advantageously given along with hydrobromic acid, for, in this combination, it very rarely causes any headache.

The combination of saline aperients with tonics I believe to be a good practice, as tending to relieve oppressed circulation, and so to cure and

remove the congestive chills that distress and depress the patient.

Iodide of potassium and chloride of ammonium may be employed for this same purpose ; and the former of these medicines, by relieving congestion of the mucous surface, I have known quickly to cut short troublesome catarrh.

Inasmuch as this hay fever is due to solar heat, and partakes in its nature somewhat of the character of sunstroke, it is necessary that the patient keep out of the sun, and the hot part of the day should be passed in a cool well-shaded apartment.

The diet should be on a generous scale, and with the meals a moderate allowance of light wine or weak brandy and water should be taken.

Cold salt-water bathing is good as a means of strengthening the system generally, as well as of conquering that morbid nervous sensibility in which the essence of the malady consists.

APPENDIX OF FORMULÆ.

TONIC AND ASTRINGENT INHALATIONS TO BE USED COLD IN THE SPRAY ATOMIZER.

Sulphate of Zinc, 1 to 5 grains.
Alum, 5 to 10 grs. ; Sulphate of Iron, 1 grain.
Tannin, 3 to 5 grains.
Liq. Ferri Perchloridi, ℥j. to ℥ij..
Liq. Sodæ Arseniatis or Liq. Arsenicalis, 10 to 20 minims.
Creasote 1-5 minims.
Chloral Hydrate 1-5 grains.

In each case to one ounce of distilled water, about two drachms for each inhalation. The two last antiseptic solutions may be syringed into the nostrils in case of summer catarrh and coryza.

The spray of Aq. Calcis, or Lime water, is recommended as an inhalation in cases of asthma with fibrinous stringy sputa. See page 134.

FORM FOR USE IN THE INHALING PIPE.

Chloroform, ℥j.;
Tinct Pyrethri, ℥ij.;
Sp. Camphor., ℥v. M.

℥j. to be used on the sponge of the pipe. (Mr. Bird.)

The Pyrethrum induces a flow of saliva into the mouth.

OPIUM OINTMENT (SQUIRE.)

Extract of Opium 1 part.
Simple ointment, 9 parts.
Mix.

A small quantity may be applied to the nostrils to relieve the irritation of hay fever.

VERATRIA OINTMENT.

Veratria 20 grains. (B. P. 8 grs.)
Simple ointment, 1 oz.
Mix.

This ointment, applied to the back of the neck, proved curative in a case of very severe laryngeal spasm after other means had failed.

Dr. Tunstall Braithwaite's "Retrospect," 1842.

The inhalation of steam, medicated according to the British Pharmacopœia with creasote, conium, iodine, &c., is best managed with Carrick's brass Inhaler or with the Eclectic Inhaler of Dr. Mac-Kenzie, each of which has the advantage of regulating and maintaining a proper temperature throughout the whole period of inhalation, as well as of rendering the process of inhaling easy and agreeable to the patient.

Among other economical and efficient inhalers is that known as Maw's double-valved inhaler, an improvement on the one invented by Nelson, inasmuch as it is provided with inspiratory and expiratory valves.

Arnold's inhaler is another of this class, and a rather more costly one is the convenient and serviceable inhaler invented some years ago by Curtis, of Baker Street.

Warm inhalations should be taken at a temperature of about 150°, in the evening before going to bed.

They are of service to asthmatic people by promoting expectoration, but if used too long they induce relaxation of the throat.

INDEX.

M'Gowan & Co., Steam Printers, Green Windmill Street, Haymarket, W.

(take for 1 month / wait a week & / then take for / another month.)

R. Liq. Sodae Ars. ʒj

Tinct. Calumb. ʒvi

— Nucis Vomic ʒj

Inf. Aurant ad ℥vi.

a table spoonful with one of water twice daily 1/2 an hour ~~before~~ after food.

G. T. H. Campbell
22 May - 1882. Putney